



NIGERIA



Annual Report on the Agricultural Department for the year 1946

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TABLE OF CONTENTS

PART I—NORTHERN PROVINCES

	<i>Page</i>
Staff and General	5
The 1946 Season	6
ANIMAL HUSBANDRY	
— Shika Stock Farm	7
— Ilorin Stock Farm	11
— Lagos Dairy Herd, Samaru	14
— Cattle Control, Kabba	14
— Mixed Farming	14
— Dairying, Kano	15
— Dairying, Kabba Province	15
— Pigs	15
— Goats and Sheep	16
— Poultry	16
— Bees	16
— Cattle Shows	16
Planned Farming at Daudawa	16
Agricultural School and Training Section	17
Botany Section	17
Chemistry Section	18
Soil Conservation	18
Irrigation	19
Groundnuts	20
Cotton	20
Guinea Corn	21
Rice	21
Benniseed	22
Millet	22
Cassava	22
Soya Beans	22
Tobacco	22
Castor	23
Dates	23
Sugar	23
Ginger	23
Onions	23
Wheat	23
Potatoes	24
Vegetables	24
Fruit	24
Fodder and Pastures	24
Kano Farm and Dairy	25
Implement Factory, Kano	25
Local Industries	25
Control of "Kashin Yawo"	25
Locusts	26
New Agricultural Stations	26

PART II—WESTERN PROVINCES		Page
General Crop and Weather Report		27
Cocoa Botanical Work		27
Kola		28
Coffee		28
Citrus		29
Cassava		29
Cocoa Survey		29
Cotton		30
Oil Palms		30
Oil Palm Research Station		31
Rice		32
Nigerian Birdseye Chillies		32
Poultry		33
Oyo N'Dama Cattle Multiplication Farm		33
Agege Cattle Fattening Scheme		34
Cattle Control, Ondo and Benin Provinces		34
The Yaba Dairy		35
Experimental Dairy, Ibadan		35
School of Agriculture, Ibadan		35
Farm School, Oyo.. .. .		36
Moor Plantation Unit Farms		37

PART III—EASTERN PROVINCES		
Season and Crops		39
Soil Fertility		40
Artificial Fertilizers		40
Lime		40
Soil Conservation Work		40
Rice		41
Oil Palms		42
Settlement Schemes		43
Fruit		44
Nipa Palms.. .. .		44
Animal Husbandry		44
Pastures and Fodder Plants		46
Agricultural and Economic Surveys		46
Botanical Work		46
Cinchona		46

INTRODUCTION

A statement of Agricultural Policy for Nigeria was accepted by His Excellency the Governor and was laid on the table of the Legislative Council as Sessional Paper No. 16 of 1946.

The following report aims at complying with one of the purposes of Regionalisation in that, contrary to former practice, a separate report is presented over the names of the officers in charge of Agriculture in the respective Administrative Regions, North, West and East. The report of Agricultural Department activities in the Colony is included with that for the Western Provinces. Reports upon Produce Inspection, and by the Agricultural Chemist and the Senior Entomologist appear as separate sections at the end of the volume.

"As an introduction to the more detailed reports on the Department's activities during the year which follow I feel that I cannot do better than quote the following extracts from His Excellency's address to the Legislative Council on the 20th March, 1947 :—

The European staff of the main body of the department has gained the services during the year of three Agriculturalists and four Development Officers for the loss of two Botanists by transfer. This net gain of supervisory staff enabled projects financed from the Colonial Development and Welfare Fund to be started at Maiduguri and Yola, where experimental farms were established, as well as a ranch near Oyo where Ndama cattle will be multiplied, and where a large poultry-breeding station will be set up. In addition to financing the Oil Palm Research Station near Benin, this Fund provided means for carrying out experiments with lime and artificial manures in the Eastern Provinces, for experimental cultivation of cinchona in the Cameroons, and for preliminary work in connection with an irrigation scheme in Niger Province.

The Produce Branch has been severely handicapped by lack of trained supervisory staff. During the first part of the year only eight Inspectors were on the strength compared with the approved establishment of nineteen. Later in the year the situation was to some extent ameliorated by the temporary secondment of three Agricultural Officers and four Development Officers.

The main purpose of the Agriculture Department is to guard the soil-fertility of the country upon which the prosperity of Nigeria rests. All other activities of the department are ancillary to this. The extensive research work, of which plot experiments on Government farms are the outward sign, and which represent the joint enterprise of field and laboratory workers, is wholly designed to meet this obligation and to find ways and means of putting proved methods into practice. This year all Government farms have carried out their full programme of experimental research, much of which was in abeyance during the war. The usual comprehensive programme of seed and variety selection both from indigenous and imported stocks continue.

The Botanical Section despite having lost two experienced officers by transfer out of an effective strength of six, has added the work of establishing a collection of new cocoa varieties to its already heavy commitments.

Further development has taken place at the Oil Palm Research Station near Benin during the year, and it has been possible to post additional European staff

for duty there. A start has been made to improve living conditions of European and African staff and to provide a water supply. An extensive programme of breeding and planting has been carried out. .

Marked progress was made by the Nigerian Cocoa Survey, which is financed by funds at the disposal of the West African Cocoa Institute. This survey aims at locating, identifying and roughly measuring individual cocoa farms, ascertaining whether any disease (including Swollen Shoot) or parasites are present, and in addition noting various facts regarding age of trees and conditions of cultivation. The survey is being carried out by some 100 trained assistants and is proceeding simultaneously in all provinces where cocoa is grown."

A. G. BEATTIE,
Director of Agriculture

July, 1947.

Annual Report of the Agricultural Department, Northern Provinces, Nigeria, for the year 1946

GENERAL

While on the one hand we have a carefully worked out Development Plan including many large scale agricultural features, on the other hand we are faced with such a shortage of staff that we have difficulty in carrying out our existing programme of work and dealing with normal expansion. Our stations at Zonkwa, Maigana, Kontagora and Okene were left without officers during the whole year and Bida and Gusau during more than half of the year. The work of these stations was not closed down, supervision being maintained by officers from neighbouring stations but the result of this overloading with duties and responsibilities cannot be altogether satisfactory. Similarly only one qualified officer was available for the large and important province of Kano where two or three officers were formerly posted and in the absence of an Agricultural Officer during part of the year for Samaru station this was added to the duties of the Senior Agricultural Officer *i/c* Agricultural School. No Chemist was available for the Northern Provinces during the whole of the year and the work of this section was in the hands of an Assistant Agricultural Officer. During the absence on leave of our only Botanist the Botanical Section was supervised by a newly appointed Agricultural Development Officer. Another Agricultural Development Officer on arrival in August was posted to Kano and an Agricultural Superintendent was posted to Samaru on his arrival during the last week of the year.

The position with regard to junior staff is not quite so bad but larger numbers of well trained men are needed and it was very disappointing that the Public Works Department were unable to start work at Samaru on the new School buildings for which plans and site have already been approved.

We are met all round with the need of housing for the accommodation of officers, regular staff and labourers, office accommodation and the usual farm buildings. In view of the inability of the Public Works Department to meet our requirements it has been necessary for our own officers and staff, who would normally be engaged on strictly agricultural work, to devote their time and energies to building construction. This has had first call on the time of the Agricultural Engineer and our officers at the two new stations which are being opened under the Development Plan at Yola and Maiduguri.

A new feature of our work is the projected large scale irrigation scheme in Niger Province. A preliminary survey has been completed in connection with the first part of this scheme but here again progress is delayed owing to inability to recruit an experienced Irrigation Engineer.

Measures in connection with soil conservation a subject which at present features so largely in the public eye—have been continued on our main farms and are being carried out in association with general resettlement schemes.

In view of these limitations it is obvious that we cannot point to the completion of any remarkable or startling new lines of development. We can however claim to have achieved a satisfactory year's work and the enthusiasm and output of energy which were prominent in the work of officers and staff during the war years have shown no evidence of diminishing during the present difficult period.

Steady progress has been made in connection with animal husbandry although the presence of contagious abortion on our stock farms and the steps necessarily taken to control this disease have interfered with breeding programmes. Mixed farming continues to gain popularity and the greatest immediate obstacle in the way of more rapid expansion is the shortage of ploughs. It appears however that we can reasonably expect the position to improve in the near future.

A feature of the year 1946 has been a steady rise in the market price of food crops due to a combination of factors, *e.g.*, the high prices paid for export crops have put more money into the pockets of the people and in the absence of consumer goods the additional money is being spent on local products including extra food. There has been no famine, but the encouragement given to the production of groundnuts and other export crops and the high prices paid for these have had the effect of reducing the acreage under food crops to a figure which is probably only very little above the safety line.

THE 1946 SEASON

2. In parts of the north the rains were a little late in starting but on the whole there was little interference with planting except in Kano Province where groundnut planting was somewhat delayed by a short drought at the end of June. Millet crops were poor; guinea corn and groundnuts had a fair season only and suffered from waterlogging in the less well drained areas. Sample plots of groundnuts in Kano Province indicated that the general yield was 100 lb per acre less than the previous season. The rains continued well into October and the cotton crop benefited from this and from the mildness of the succeeding harmattan. Rice in parts of Sokoto was damaged by excessive flooding.

In the middle belt there was a serious shortage of rain in the early part of the season. Guinea corn, millet, maize and yams suffered accordingly, but good late rains saved the crops from disaster. Rice was reduced to half the annual crop by drought in Niger-Ilorin. Typical rainfall records are shown in the tables below:—

NORTH

	BAUCHI		KAFINSOLI		SAMARU	
	Average <i>in.</i>	1946 <i>in.</i>	Average <i>in.</i>	1946 <i>in.</i>	Average <i>in.</i>	1946 <i>in.</i>
January	—	—	—	—	—	—
February	—	—	—	—	0.05	—
March	0.09	0.10	—	—	0.35	0.54
April	1.71	1.97	0.24	—	1.35	—
May	3.57	1.48	2.70	2.00	4.98	6.44
June	5.99	5.05	3.94	2.78	6.55	7.51
July	9.58	16.63	7.72	12.58	8.62	12.8
August	15.30	16.49	11.45	8.89	11.90	16.58
September	7.34	11.84	5.91	8.57	8.55	10.07
October	1.81	4.10	0.50	0.32	1.42	2.90
November	0.18	—	—	—	0.04	—
December	0.01	—	—	—	0.01	—
Total	45.58	57.66	32.46	35.14	43.82	56.12

MIDDLE BELT

	ILORIN		YANDEV		BIDA	
	Average in.	1946 in.	Average in.	1946 in.	Average in.	1946 in.
January	—	—	0.38	—	—	—
February	0.72	0.16	0.77	1.56	0.39	—
March	2.16	1.49	1.45	1.64	1.20	1.72
April	4.19	1.04	3.83	2.50	2.32	1.25
May	6.64	7.48	7.44	5.17	5.48	4.96
June	7.60	3.63	7.28	6.48	7.58	4.15
July	7.67	3.03	5.32	2.69	7.11	4.43
August	4.70	3.48	6.96	0.67	9.04	6.64
September	9.76	2.91	11.38	9.66	9.29	6.86
October	6.96	10.48	9.22	8.22	4.27	5.61
November	1.25	—	0.57	0.01	0.58	0.49
December	0.30	0.42	0.20	0.01	0.18	—
Total	51.95	34.12	54.80	38.61	47.44	36.11

ANIMAL HUSBANDRY

3. *Shika Stock Farm*.—After a falling off in milk yields at Shika Stock Farm in recent years it is satisfactory to be able to report a small increase in the average yield of Fulani cows and a bigger increase in the Sokoto Gudali herd in 1946. Apart from the effect due to the use of sires selected for good milking pedigree two other factors undoubtedly helped to raise the herd averages for milk production. First, good health, in general, was maintained throughout the year and, in particular, trypanosomiasis, which adversely affected milk yields in 1945, is now under control. Secondly, the repeated falling off in yield which occurred during the previous few years made a review of all stock urgently necessary; this was done early in 1946 and drastic measures were taken with regard to culling inferior milkers.

During the year ninety-one lactations were examined, the production average being 2,336 lb. Corresponding figures for 1945 and 1944 were 2,134 and 2,111 lb respectively. As far as possible all factors which effect the herd yields have been taken into account and analysed accordingly. As in previous reports a table (shown below) has been prepared, summarising the effects of immature and mature lactations for the period 1942-46; 1937, being a record year, is included for comparative purposes. The first and second lactations have been accepted as immature lactations whereas the fourth and subsequent lactations are regarded as mature.

	Number of Lactations Analysed	Percentage of 1st and 2nd Lactations	Percentage of 4th and subsequent Lactations	P.D.B.C.* Index	P.D.B.C. Corrected Index
<i>White Fulani Herd</i>					
1946	91	47.2	39.5	6.18	7.27
1945	80	47.5	38.7	5.51	6.74
1944	74	50.0	17.6	5.49	6.69
1943	48	64.6	6.2	6.09	7.53
1942	73	58.9	30.1	6.70	8.09
1937	47	51.0	33.3	7.03	8.30
<i>Sokoto Gudali Herd</i>					
1946	21	47.6	42.9	6.98	8.51
1945	18	27.8	33.3	5.58	6.45
1944	18	77.7	11.1	5.41	6.84
1943	16	75.0	6.2	6.21	7.80
1942	28	39.3	42.8	6.37	7.61
1937	24	37.5	37.5	8.40	9.81

* P.D.B.C.= Pounds per day between Calves.

The same correction factors have been employed as in previous years, *viz.*

Lactation	Correction P.D.B.C.	Correction Yields
1st	1.42	1.31
2nd	1.31	1.30
3rd	1.18	1.18
4th	1.09	1.10

Table II below gives the outstanding lactation yields for the year. The table also shows the sires of the high yielding cows. It will be seen that White Fulani Stock Bull No. 19 has again made a worthy contribution to the herd.

TABLE II

WHITE FULANI				SOKOTO			
Cow	Yield	Lactation No.	Sire	Cow	Yield	Lactation No.	Sire
382	3,953 lb in 521 days	2	13	221	4,494 lb in 351 days	1	17
295	3,952 " 290 "	5	19	212	4,364 " 377 "	1	17
318	3,949 " 292 "	5	19	217	3,992 " 344 "	1	17
328	3,769 " 332 "	4	20	152	3,655 " 321 "	4	6
319	3,593 " 277 "	5	19	214	3,653 " 346 "	1	16
488	3,569 " 305 "	2	24	219	3,414 " 356 "	1	17
392	3,505 " 354 "	3	13	163	3,213 " 250 "	4	14
317	3,487 " 291 "	4	19	—	—	—	—
484	3,395 " 370 "	1	13	—	—	—	—
452	3,390 " 324 "	2	24	—	—	—	—
289	3,286 " 293 "	6	19	—	—	—	—
333	3,284 " 326 "	5	19	—	—	—	—
521	3,250 " 316 "	1	29	—	—	—	—
495	3,226 " 325 "	2	24	—	—	—	—
401	3,220 " 292 "	3	24	—	—	—	—
386	3,209 " 278 "	4	13	—	—	—	—
388	3,191 " 305 "	3	24	—	—	—	—
511	3,176 " 326 "	1	26	—	—	—	—
408	3,058 " 327 "	3	13	—	—	—	—
295	3,048 " 239 "	6	19	—	—	—	—
325	3,048 " 289 "	5	4	—	—	—	—
296	3,026 " 319 "	5	19	—	—	—	—

The influence of various sires on the year's lactations is shown in the following table:—

TABLE III
INFLUENCE OF SIRE ON 1946 YIELDS
WHITE FULANI

Place	Sire	Founda- tion Strain	Number of Daughters	Corrected average yield 1946 Lactations	Average Corrected P.D.B.C.	Average Yield 1946 Lactations	Average P.D.B.C.
1	13	2	9	3,578.29	8.26	3,014.2	6.86
2	4	4	3	2,991.13	8.70	2,898.0	8.46
3	19	19	15	2,873.24	7.87	2,850.0	7.80
4	24	4	19	2,804.52	7.68	2,211.5	6.00
5	26	2	10	2,791.74	7.62	2,135.1	5.49
6	20	20	1	4,145.90	9.09	3,769.0	8.34
7	27	12	1	2,808.64	7.43	2,144.0	5.23
8	21	21	2	2,562.50	8.00	2,562.5	8.00
9	28	2	2	2,503.41	7.20	1,911.0	5.70
10	29	16	5	2,502.36	7.43	1,910.2	5.25
11	18	18	3	2,418.00	5.86	2,418.0	5.86
12	14	2	6	2,269.02	5.80	2,203.5	5.61
13	23	2	3	2,246.70	6.73	1,868.6	5.57
14	22	2	7	2,022.53	5.46	1,554.1	4.13
15	12	12	1	1,972.0	3.68	1,972.0	3.68
16	17	17	3	1,958.63	5.66	1,915.6	3.54
17	25	4	1	1,821.92	5.65	1,544.0	4.79
Herd Average				2,708.94	7.27	2,336.0	6.18

SOKOTO GUDALI

Place	Sire	Foundation Strain	No. of Daughters	Corrected average yield 1946 Lactations	Average Corrected P.D.B.C.	Average Yield 1946 Lactations	Average P.D.B.C.	Most outstanding Lactations recorded above
1	17	7	5	4,762.11	11.19	3,653.2	7.88	4
2	6	6	2	3,528.25	10.65	3,207.5	9.77	1
3	16	2	3	3,667.18	8.98	2,350.0	6.59	1
4	9	9	1	3,105.70	4.49	2,389.0	3.43	—
5	10	10	2	2,833.74	7.12	2,480.5	6.18	—
6	12	12	2	2,730.50	7.17	2,730.5	7.17	—
7	14	2	3	2,502.65	7.02	2,232.6	6.30	1
8	3	3	1	2,519.00	7.41	2,519.0	7.41	—
9	15	7	1	2,242.00	6.99	1,900.0	6.12	—
10	13	13	1	1,875.50	5.39	1,705.0	5.44	—
Herd Average				3,259.39	8.51	2,727.33	6.98	—

It is notable that the first four places in order of merit have in 1946 been secured by four of Shika's best bulls. S.B. 13 (strain 2) which secured first place still holds the record. The second and fourth place was creditably held by the strain of S.B. 4. Mention has already been made of S.B. 19 which takes the third place. The daughters of S.B. 19 are now advancing in age with consequent falling off in milk yield and this will of necessity effect his apparent influence on the herd.

Health of Stock, Calf Scour. There were twenty-three cases of calf scour during the year among a total of 210 calves born. This brought the incidence of this disease to 10.95 per cent. The low incidence of scour in the past two years is undoubtedly attributable to effective fly control, achieved by conversion of the calf pens into fly-proof buildings and the frequent use of D.D.T. In addition calf scour vaccine was used throughout the year, 158 calves being vaccinated while fifty-two (used as controls) were not vaccinated. In all cases of scour the drug Sulphaguandine was exclusively used with success. Vaccination showed a slightly beneficial effect in the control of this disease with a percentage of 3.33 per cent over untreated calves.

Pneumonia in Calves. This disease has assumed some proportion in recent years and cases are naturally more frequent during the cold season. M. & B. 693 has proved effective for control of the disease and is now extensively used.

Mastitis. There were four cases of mastitis during the year. Though recovery was slow, treatment was effective.

Contagious Abortion. In view of the confirmation of this disease among a few animals in 1945 the Veterinary Department undertook agglutination tests of the whole herd between August and October. All stock, with the exception of calves under two months were tested. The results of these tests tended to show that over 40 per cent of the whole herd reacted positively or doubtfully. This result was particularly conflicting in view of the actual number of abortions and still births recorded over the previous seven years. These were as follows :—

Year	All Births	No. of Abortion and Still Births	Percentage
1940	201	9	4.5
1941	220	6	2.7
1942	190	7	3.7
1943	189	17	8.9
1944	256	9	3.5
1945	198	15	7.6
1946	224	14	6.2

In view of these facts and the apparently benign nature of the disease as reflected in the above table, the whole subject has recently been thoroughly discussed with the Veterinary Department with a view to formulating some means of control other than the slaughter of positive and doubtful reactors and the consequent loss of valuable pedigree animals.

Trypanosomiasis. The clearing of undergrowth along streams in the vicinity of Shika during 1945 has undoubtedly proved effective, the incidence of trypanosomiasis being very small in 1946. Twenty-five blood slides were submitted for examination and only three positive cases were confirmed. The drug Phenanthridinium has proved very effective in controlling this disease.

Routine Inoculation. - Rinderpest immunisation of all (143) young stock was carried out in October using Dried Goat Virus. Severe reactions occurred a few days after inoculation, consisting of high temperatures, profuse scouring and copious lacrymation.

As a result twenty calves died making a mortality percentage of fourteen. Some slides taken from the affected animals were positive to red-water, piroplasmosis and anaplasmosis. It would therefore seem that the effect of the virus was sufficiently severe to bring out other diseases which would normally have remained dormant in the animal.

4. *Ilorin Stock Farm.*—All records at Ilorin Stock Farm were carefully examined and in consideration of the information thus brought to light, recommendations were made for certain modifications in the research and routine work at this station.

Population.—There was a gross increase of eighty-seven animals over the 270 with which the year was started. Of these eighty-five were born and two purchased. Forty-four deaths were sustained and six sales made.

Transfers were as follows:—

Two N'Dama bulls to Kaiama and one to Yandev.

One Work bull, one Gambia bull, one Gold Coast and one Kaiama to a mixed farmer.

101 Cattle were isolated under open range conditions at Sobi on account of contagious abortion.

Protozoic Infection.—Of the animals actually on the farm at various times of the year (*i.e.*, excluding those isolated away from the farm for the period during which they were isolated), twenty-three were infected with trypanosomiasis only out of which eleven died. Eleven had a combination of trypanosomiasis and anaplasmosis, twelve trypanosomiasis and piroplasmosis and twenty all the three diseases, two died of trypanosomiasis and anaplasmosis. Thirty-five animals were treated with Tartar Emetic, three with Phenanthridinium while sixty-two received Trypan Blue.

Protozoic infection was heaviest in November and December and half the losses were sustained during this period. The reduction in the infection, 154 cases as compared with 296 last year, is chiefly due to the removal of 101 animals to Sobi for contagious abortion during the last quarter of the year and no parasite investigations were made on these except in severe cases. Tick-borne diseases were wholly or partly responsible for 131 infections and twelve deaths.

Minor Ailments.—Sores and bruises caused by horns during fights necessitated the introduction of routine dehorning with caustic soda at the age of two months. A few cases of worms, in spite of routine drenching, and scouring occurred especially amongst calves.

Contagious Abortion.—Results of agglutination tests, started late in February in view of suspected Contagious Abortion, showed fifty-seven positive and thirty-four doubtful reactors by the end of December. Of the positive reactors thirty-nine are W.A. Shorthorn animals including eight calves which had to be isolated with their dams, and eleven N'Damas including two calves which were with their dams. In the doubtful herd there were twenty W.A. Shorthorns including seven calves, two of which are now dead, and one N'Dama. These tests are still continuing.

The positive and doubtful herds were isolated separately under open range conditions near Sobi. The latter is being retested with the purpose of drafting positive reactors to the first batch and returning those definitely negative to the Farm.

Management, Feeding System.—Every effort was made to provide enough hay and silage for use during the dry season. Thirty-six tons of hay were made. In November and December it was necessary to collect Gamba which had already flowered from areas outside the farm because pastures shut off for hay during August failed to provide the bulk expected. For the first time silage was made on the farm. Two types of pit-silos

were tried and these were filled with sixty tons of very good Kyasuwa and chopped elephant grass. During the rainy season, all stock, with the exception of sick animals, which received concentrates, were maintained on grass only.

Routine Inoculations. 269 Farm animals were inoculated against Blackquarter and Rinderpest in January. In June all, numbering 296, received inoculations against Anthrax, Blackquarter and Rinderpest. In September, when there was an outbreak of Rinderpest in the neighbourhood of Ilorin, the Farm animals were inoculated with Rinderpest Spleen Vaccine.

The West African Shorthorn Herd.—This herd increased from 100 to 118, there were thirty-five births, fifteen deaths, one transfer to a mixed farmer and one sale. The number of days between calves for thirty-one animals that calved, excluding five heifers, was 401 days. There were one abortion and one still birth.

After the detailed analysis of stock figures on the Farm the Veterinary Officer and Agricultural Officer recommended that this herd should be disbanded because, in comparison with N'Damas, the records did not indicate that its usefulness was likely to justify its continued maintenance. They pointed out that it is uneconomic to keep the herd merely for the purpose of investigating inheritance of resistance to trypanosomiasis and that in any case these animals would form very poor material for such investigations since 83 per cent of their services were from bulls which either died of trypanosomiasis or made a very poor recovery from the disease. No decision had been taken before fifty-four animals were removed to Sobi for Contagious Abortion.

Losses in this herd were as follows :—

<i>Tryps:</i>	<i>Anaps:</i>	<i>Piroplasmosis</i>	<i>Tryps: and Piros:</i>	<i>Piros: and Anaps:</i>	<i>Due to other causes</i>
3	1	1	2	1	7

Four animals were treated for trypanosomiasis and seventeen for tick-borne diseases.

The N'Dama Herd.—The N'Dama continues to be the best beast on the Farm. The herd increased from sixty-five to seventy-two. There were twenty-three births, fourteen deaths, three distributed to outstations, and one sale. Eleven were isolated at Sobi for contagious abortion including two calves. The losses were as follows and were chiefly amongst young stock :—

<i>Tryps:</i>	<i>Anaps:</i>	<i>Piros:</i>	<i>Due to other causes</i>
1	2	2	9

One animal was treated for trypanosomiasis with Tartar Emetic and eight with Trypan Blue for tick-borne diseases.

The average number of days between calves for twenty-one cows is 432 days, compared with 401 days in 1945 and 506 days in 1944.

Until he was transferred to Sobi as a positive reactor to Contagious Abortion IND 57 was the Stud Bull. He had twenty-two successful services and twelve failures with the N'Dama herd and twenty-three successes five failures with the Graded herd. Of the twelve failures with the N'Dama herd five were from ND 26 a cow which had previously been served unsuccessfully twenty-three times by various bulls.

The Graded Herd.—Twenty-one animals were born into the herd and there were twelve deaths. There were two sales and two purchases so that the total in the herd is now ninety-nine an increase of nine over 1945.

The losses are classified as follows :—

<i>Tryps :</i>	<i>Piros :</i>	<i>Anaps :</i>	<i>Other causes</i>
3	2	1	6

Twenty animals including the three that died were treated for trypanosomiasis and twenty-one including one that died from tick-borne diseases. There are now two animals which are $\frac{1}{2}$ N'Damas. Their respective weights at birth were 33 lb and 40 lb. These animals as well as the $\frac{1}{2}$ N'Damas very closely resemble the pure N'Damas. Crosses with Gambia have been as expected, the best.

Work Beasts.—Due to the bad condition of the farm in 1945, these animals were called upon to do extra work. They put in, apart from the normal routine work of carting, 7,004 cattle hours for ploughing and cultivating 58 acres of farm land and 24 acres of pasture.

Cattle Distributed to Outstations.—Only three N'Dama bulls were distributed to outstations. The two sent to Kaiama died of blackquarter within two months of arrival and within six months of inoculation; blood smears from the one sent to Yandev have shown trypanosomes. Animals distributed previously continue to give good accounts of themselves.

Routine Records.—The only alteration in the usual routine records was in connection with milkings.

Milking.—The system of partly milking a cow and then allowing a calf to suckle was considered unsatisfactory. All cows in milk are now milked right out once a week; on these days the calves are not allowed to suckle and so far they have shown no ill-effect. This gives a better indication of the capacity for milk than the previous system.

Marking of Ears.—The previous system of using ear tags was unsatisfactory because they were frequently lost and identification when adult depended on recognition of the animals by the cattlemen. The present system is to punch notches representing serial numbers in the ear when the animals are two months old. This serial number is then replaced by the herd number when the animal is adult.

Analysis of Cattle Records.—A detailed analysis of all records available on the farm up to March was made and the following facts emerged :—

- The N'Damas are the most resistant breed to trypanosomiasis with W.A. Shorthorns second and Borgawa third.
- Regarding the survival index, insufficient data were available on which to base conclusions, but it appears that the N'Damas compare favourably with other breeds.
- The N'Dama appears to be larger and heavier than the W.A. Shorthorn and in addition it is able to transmit these characters. The Borgawa tends to be larger but more lightly built than the N'Dama.
- The W.A. Shorthorn is the most prolific breed, followed by Kaiama and the N'Dama in that order.
- An analysis of the heights and weights of W.A. Shorthorn calves taken at three months intervals between birth and twenty-one months of age shows a highly significant correlation between size and susceptibility to trypanosomiasis. At all ages up to twenty-one months animals which, either during this period or subsequently, either died of or made a poor recovery from trypanosomiasis were heavier and larger than animals resistant to this disease. This appears to indicate that selection for trypan-resistance in this breed is leading us back to the dwarf brachyceros (Muturu) type.

5. *Lagos Dairy Herd, Samaru*.—At the end of the year 1946 the herd maintained at Samaru on behalf of the Lagos Dairy included 118 cows and mature heifers and fifty-four young heifers. Thirty-one cows (indifferent milkers) were drafted out of the herd during the year for breeding to an N'Dama bull with a view to the future trial of their cross-bred progeny in tsetse areas. Forty-eight cows were brought into the dairy herd from Vom.

Milking.—Prior to June 1946 all cows were milked out entirely by hand and the calves, from four days old, were bucket fed. Up to this time the cows were difficult to milk, milk yields were low, lactations of very short duration, calves were in poor condition and there was considerable trouble with scour. In June a new system was introduced whereby the cows were milked in the presence of their calves and lactation improved considerably. In November the system was again altered slightly, the calves were allowed to suckle two teats and two teats were milked by hand and the milk recorded. The two teats suckled and hand milked were alternated daily. Once per week the cows were milked out entirely and the calves bucket fed on that day. The result of this was a very considerable all round improvement; not only did the milk yield increase, but there was a vast improvement in the condition of the calves and no case of scour has been reported since then. This system is still in force and continuing to give good results.

Rinderpest.—The first case of this disease appeared in April, 1946, and a number of beasts were subsequently attacked. There were fourteen cases in all of which nine were fatal and six, with three fatalities, were affected by inoculations. All stock were again inoculated in August since when no new cases have appeared.

Contagious Abortion.—At the end of February, 1946, after a series of tests, the herd was declared free from contagious abortion, but in August, when testing was renewed, ten animals gave positive reactions and were immediately salvaged. The total number of abortions during the year was three of which one was a negative and one a doubtful reactor.

6. *Cattle Control, Kabba*.—Steady progress has been made with control of village herds. Practically all cattle in the province have been brought under control, the number of kraals being twenty-seven in Igbirra area and thirty-four in Kabba, including Isanlu area, with a total cattle population of 3,883 at the end of the year. The people are gradually grasping the value of kraaling their cattle which results in the production of farm yard manure. In most places the cattle boys farmed small areas around the kraals and application of manure resulted in better growth of crops and served as a useful practical demonstration. Improved bulls from Ilorin running with village herds continued to do good service and their progeny show marked superiority in size over pure Nigerian Shorthorn dwarf cattle. Two of the bulls—I W 49 and I G C 135 were lost from trypanosomiasis during the year.

7. *Mixed Farming*.—There was a net increase of 764 in the number of practising mixed farmers, 965 new farmers having been set up and 201 closed down. The total number at the close of the year was 3,327 and the rate of expansion over five-year periods is shown below :—

Year						Active Mixed Farmers at end of year
1931	..	..	..	..	..	44
1936	..	..	..	..	..	1,054
1941	..	..	..	..	..	2,031
1946	..	..	..	..	..	3,327

There is no doubt about the increasing popularity of mixed farming. The number starting in 1946 showed an increase of 64 per cent over the previous year and this figure could probably have been doubled had facilities been available. Scope for ultimate expansion is almost boundless but several factors militate against immediate rapid development. An obvious handicap during the past year has been the impossibility of importing ploughs in sufficient numbers. This has not been allowed to stand in the way of our propaganda for the encouragement of cattle keeping by farmers and many hand farmers are now keeping beasts for meat or milk production and manure making. A further obstacle is the difficulty of obtaining suitable cattle at reasonable prices for distribution to farmers under the mixed farming scheme. Suitable animals are in existence but when Agricultural Officers or Native Administration officials require to buy in large numbers prices are bound to be affected. In addition the training of large numbers of work-bulls and the nursing of mixed farmers made a great deal of work, and we have to contend also from time to time with outbreaks of disease in our cattle-pools. It is considered therefore, that until the number of Agricultural Officers is substantially increased we cannot, as a Department, expect to set up more than one thousand farmers annually. But the farms thus started should serve as demonstrations and models which can be copied by other hand farmers independently and it is by this means that we should expect widespread expansion ultimately to take place.

8. *Dairying, Kano.* -The main butter factory and creameries having been handed over to the Veterinary Department in 1945 only a small scheme was run, in conjunction with the Dairy farming scheme, to supply fresh milk, cream and pure soured skim milk to Europeans and Africans in Kano. The total turnover in respect of milk and milk-products was £784.

9. *Dairying, Kabba Province.* -Two dairies in the province, at Okene and Kabba respectively were handed over to the Native Administrations during the year, but were operated under direct supervision of Agricultural staff. Okene dairy bought 26,557 lb of milk from village kraals and produced 1,650 lb of butter compared with 18,306 lb and 900 lb respectively for 1945. Kabba creamery bought 5,859 lb of milk and produced 350 lb of cream. Although there was some increase in the number of cattle, the increase in milk production in Okene area was mainly due to improved management.

10. *Pigs.*—With the removal of the armed forces from Nigeria came a great reduction in the demand for bacon and appropriate steps were therefore taken to curtail production. Breeding was cut down ; sows were culled on a large scale and sold for consumption as fresh meat at salvage prices, and litters for rearing and fattening were reduced to a maximum of six pigs each. Arrangements were made for the closing down, by easy stages, of Zonkwa and Daudawa piggeries and this was completed before the end of the year. The Department is thus left with three main piggeries, Shika, Samaru and Minna where breeding and fattening are still carried on. Shika is also our centre for the production of breeding stock for distribution, while at Samaru, in addition to fattening our home bred pigs, we also fatten those bought as weaners from settlers at Anchau. Similarly, pigs bred by farmers at Bauchi are sold to the small Government piggery for fattening.

Towards the end of the year there was a revival in the demand for pigs for bacon amounting to a total requirement of about 400 per month. Every encouragement has been given to private pig-keepers and these now take a large share in the industry. Apart from those who breed pigs and sell weaners, seven private individuals are making a successful business of breeding and fattening under approved conditions. During the year a total of 2,973 pigs were railed to Lagos for bacon manufacture and of these 57 per

cent were supplied from private piggeries. It is our intention in due course to turn over the whole of this industry to private individuals with the exception of the production of breeding stock for distribution from Shika.

Experiments have been carried out in connection with the production of salt pork for supply to parts of the country where other meat is scarce and where refrigeration does not exist.

11. *Goats and Sheep.* No large scale work has been attempted with small livestock, but we have sufficient evidence from observations made on our various farms to enable us to conclude that sheep and goats cannot be kept successfully in confinement; but given a reasonable amount of range they can thrive and are also a useful source of manure. Tethering is usually necessary in the rains to prevent damage to growing crops.

12. *Poultry.* A large scale breeding centre is under consideration but, owing to staff shortage, this must be postponed for some time. Meanwhile small flocks of European and half-bred fowls are maintained at several of our stations and trap-nesting and recording and selective breeding are carried out at Bauchi and Ilorin. Breeding stock and eggs for hatching have been distributed and there is a demand for far more than we are able to produce.

13. *Bees.* Fifty queen excluders and a hundred sheets of foundation wax have been imported from England for trial in Bornu. A swarm brought from Egypt by the Agricultural Officer, Maiduguri, was unfortunately lost in a tornado.

14. *Cattle Shows.* A cattle show was held at Daudawa in November, 1946. Most of the cattle entered were sold by auction the next day to the leading Lagos buyers, the total sales amounting to £2,943 with an average price of £11 3s 6d. At present the value of a winning animal is his meat value, but there is little doubt that not many years will pass before the winning animals will be sold at enhanced prices for breeding purposes.

There is no doubt about the value of these shows not only as an entertainment but as a stimulus to cattle keeping and cattle improvement and it is intended to introduce them at other centres in 1947.

PLANNED FARMING AT DAUDAWA

15. In early 1945 twenty-eight new fifteen acre holdings were added to the existing sixty-four holdings. This increase was effected by the Katsina Native Administration taking over farmland in adjacent hamlets, pooling the land, and redividing it into controlled holdings. The Katsina Native Administration is giving a great deal of attention to the Scheme, and the ultimate objective is a central village with a school, dispensary, village institute, market. A co-operative buying and selling organisation is also visualised to serve a large area divided into controlled holdings, fuel and grazing reserves and irrigated gardens. At present the fuel and grazing reserves have been demarcated, the dispensary, school and village institute are almost completed, and a new village for the non-farming community is in progress of building. The immediate extension of this scheme to provide for still more planned holdings before the 1947 farming season is under consideration. There is a keen demand for new holdings, for Daudawa has gained some reputation as a place of prosperity. The planned area is run on communal lines in that, although each farmer farms his own holding, all produce for sale is handed over to the Native Administration marketing organisation and the proceeds are paid into the Mixed Farmers Advance Schemes, which functions as a Land Bank. An analysis of the Land Bank figures showed that for the four years

1942-46 the average income of a Daudawa farmer was about £40 per annum. With the existing higher prices the average income in 1946 will be in the region of £60 per annum. It should however be pointed out that hitherto the overhead costs of this organisation have been borne by Government and the Native Administration. It is reasonable that this should be so during the initial stages of the scheme but the time has now come to reorganise on a sound economic basis. All expenses such as transport, storage accommodation, weighing machines, wages of clerk or secretary, etc., would then be borne by farmers participating in the scheme.

AGRICULTURAL SCHOOL AND TRAINING SECTION

16. Five out of the six students comprising the Final Third-Year Class in 1945-46 were successful in qualifying as Agricultural Assistants and were posted for duties in the Department.

The 1946 Session opened on 1st April with nineteen First-Year Students, nine Second-Year Students and seven Third-Year Final Students. Only one First-Year recruit resigned, leaving a total of thirty-four in training. In the December examinations and in tests six of this Third-Year Class qualified as Assistants and have been posted. All of the First-Year Class were retained for further training on successfully passing their tests in which three obtained distinctions. Second-Year Students continued their training at outstations under Agricultural Officers and under the general supervision of the officer in charge of the School. Nineteen students are being appointed to First-Year Classes in 1947 including five natives of the Northern Provinces so that a total of forty-six will be in training in the forthcoming session.

A feature of the year has been the successful establishment of a Students' Union Club comprising social and other activities proper to a school of this type. The school, however, continues to operate under difficult and cramped conditions. The Public Works Department has so far been unable to start building the proposed new main School, hostel and quarters; in consequence it has been necessary to abandon projected courses for Field Overseers and Field Instructors.

At various dates throughout the year short courses were organised for eleven newly appointed Development Officers prior to their taking up duties under the Administration.

The Kafinsoli Training Centre for prospective mixed farmers has continued to operate; preference was at first given to ex-service men requiring training, but in view of the small number of applicants from these, other candidates were accepted.

A new Training centre at Riyom completed its first-year with ten young farmers selected from local schools. Owing to a late start they are being kept on for a second season. Subjects in which they receive instruction include cattle husbandry, composting, crop rotation, soil conservation measures and irrigation.

BOTANY SECTION

17. The work of this section included variety yield trials of a large number of crops of greater or less importance in the Northern Provinces, *viz* groundnuts (25 varieties), guinea corn (6), sweet potatoes (16), soya beans (16), sugar cane (14), and sunflower (6); observations were made on specimen plots of a large number of minor crops. A collection of indigenous legumes were grown in plots for observation with reference to their value as food for man or stock or for cover-cropping, etc. Various imported legumes are being tested for the same purpose.

The multiplication of tested strains and selection work on cotton have been continued along the usual lines and mosaic-resistant cassava hybrids have been tested against local varieties.

In connection with grasses, "Kyasuwa" selections have been made with a view to finding a late flowering type for maximum fodder production; two of these selections show promise. Sixty-nine local perennial grasses are being grown as a living herbarium to provide information regarding time of flowering, habit of growth, and possible value as fodder or grazing. Forty-six annual grasses were treated in the same way but these plots are rather unsatisfactory owing to the presence of volunteer plants of other species; it is proposed in future to maintain annual types in pots.

Land has been acquired for a new "fadama" farm at Maska. This will not only enable us to work with typical wet-land crops such as sugar cane and rice, but, by enabling two crops to be grown annually, progress with selection work, etc., with other crops should be accelerated.

Varieties, etc., giving the most satisfactory results in these trials at Samaru have been multiplied and sent to outstations for further testing.

CHEMISTRY SECTION

18. In the absence of a chemist an Assistant Agricultural Officer was in charge of this section throughout the year. His work included routine analysis of grass specimens to determine what changes take place in crude protein, crude fibre and moisture as the growing season advances. Analyses of feeding stuffs and soils have been made on occasional samples submitted by the Veterinary Department and by Agricultural Officers.

The Assistant Agricultural Officer was also responsible for lectures in Physics and Chemistry at the Agricultural School, and for the analysis of ginger samples in connection with the marketing of the crop for export.

SOIL CONSERVATION

19. The urgent need for the protection of the soil and the proposed steps to be taken towards dealing with this problem have been mentioned in previous reports.

The Agricultural Engineer has been in direct control of soil conservation measures at Shika and Samaru, and has advised on details of method to be adopted in connection with similar work on other Government Farms and Native Administration Farm Centres. The following data in respect of Shika and Samaru are of interest.

Shika.—Soil conservation work has progressed favourably in the bush-covered areas of the estate, all the work being done by hand labour. Work began in September 1945.

Type of Terrace (Standard) 17 feet width overall "S" type.

(Farm) 20 feet width overall "S" type.

(Diversion) 30 feet width overall "S" type.

Length of terracing completed by hand labour from

February 1946 to January 1947 inclusive.. .. 15½ miles

Total length of terracing done to date 32 miles

Area affected during past twelve months 231½ acres

Total Area affected to date	359½ acres
Average cost per straight-run yard	1s 7d.
Average all-in cost per yard, including materials, crossing gullies, rocky land, etc.	6.6d.
Cost per acre affected (to date)	86s 9d.
Rainfall at site for 1946	55.64 inches
Estimated weight of water held on land during that period ..	1,250,000 tons

Samaru.—Work here is on a very much smaller scale than at Shika. Some work was tried with ex-R.A.F. equipment comprising a “Case” Tractor and a No. 2 “Motrac” two furrow plough but results were not encouraging, the tractor being unable to get sufficient grip and the plough being too light.

Details of the work are as follows:—

Work began in June 1946.

Types of terrace (Standard) 17 feet overall width “S” type.

Special for Golf Course 7 feet overall width “S” type.

Machine made terrace 20 feet overall width inverted “V”.

Length of hand made terracing during year to date (7½ months) 5¼ miles

Length of Machine made terracing during year to date (7½ months) 1 mile

Area affected to date 76 acres

Rainfall at site for 1946 (from July onwards) 36.27 inches

Note.—Costs are the same as at Shika, the work being of the same kind and the daily task the same.

In addition the Agricultural Engineer has given advice with regard to protective measures being carried out on the Plateau and at various centres of “development”. He visited the Eastern Provinces during the rainy season in connection with soil erosion, reported upon conditions found there, and made recommendations regarding conservation measures.

IRRIGATION

20. In March 1946 an Executive Engineer was seconded from the Public Works Department for work in connection with an irrigation scheme in Wuya-Edozhigi, Niger Province. Provision was made also for the appointment of an experienced Irrigation Engineer but none has yet been recruited. Meanwhile the Executive Engineer has completed a survey of the first compartment of the proposed irrigation scheme based on recommendations made by Mr C. J. Rae, Irrigation Engineer, Sierra Leone. Information is now available in connection with this No. 1 Compartment which makes possible (a) the siting of the Kaduna River embankment and calculation of the capacity of the bank, (b) the siting of the channel for the Kaduna River flood-water, (c) the siting of the main channels to be fed from the Kupanko and Edjiko streams and (d) the siting of a line for the main drainage.

The construction of an Irrigation Engineer's office at Bida was completed and quarters were built.

Minor irrigation schemes, incorporating earth dams, continue to operate successfully in Niger Province. Irrigation on a small scale is carried out on several of the Government Farms and Native Administration Farm Centres. A “Persian Wheel” is being imported from the Sudan for trial at Maiduguri and a cattle-operated water lift is in use experimentally at Bauchi.

GROUNDNUTS

21. In view of the continued urgent need for oil seeds for export to the United Kingdom every possible encouragement was given the further expansion of groundnut growing in suitable areas, and there is no doubt that a greater acreage than ever before was planted with this crop in 1946. We have probably now reached the maximum with regard to the acreage of groundnuts which can be grown under existing farming methods and future propaganda must be directed towards closer planting and improved inter-cultivation. A further stimulus to groundnut growing was an increase in price to £16 per ton at railhead.

The unusually wet season, with water-logging over large areas, reduced yields to below average, but it is evident that the total crop available for export will be slightly in excess of that of last season and will thus constitute a new record.

Yields from Demonstration Plots showing the advantage of close planting in all twenty-three districts of Kano Emirate are interesting. These, expressed in terms of the average weight of decorticated nuts is in lb per acre, are shown below :

SOUTHERN BELT (SOUTH OF A LINE GWARZO-BIRNIN KUDU)

	1943	1944	1945	1946
(a) Close planting	617	720	599	690
(b) Local spacing	473	592	483	507

MIDDLE BELT (SOUTH OF A LINE BICHI-GABASAWA-RINGIM JAHUN)

	1943	1944	1945	1946
(a) Close planted	544	543	735	710
(b) Local spacing	502	536	585	435

NORTHERN BELT (DAMBARTA-BABURA-GARKE-TAURA)

	1943	1944	1945	1946
(a) Close planted	488	465	696	511
(b) Local spacing	386	344	553	437

The average for all the districts shows an increase of 223 lb decorticated nuts per acre in favour of close planting. It is estimated that yields in the districts were about 100 lb per acre less than last year, but increased acreage has compensated for this.

COTTON

22. The prolonged wet season, noted above as being detrimental to the groundnut crop, was of great assistance to cotton, the success of which depends to a large extent upon October rains. The present shortage of imported textiles means a big demand for Nigerian made cotton cloth but the surplus lint for export is expected to compare favourably in quantity with the 33,000 bales from last year's crop. Good prospects are reported in Katsina, East Sokoto and Zaria Provinces, which produce the bulk of the export crops. There is increased production in Kontagora where the new ginnery, opened by the B.C.G.A., is a welcome institution.

In Bauchi Province very heavy rains in July and August had an adverse effect on the crop and it is not as good as last year. In Gombe Division, owing to restricted seed distribution, production was not sufficient to meet the local weaving demands. In normal pre-war years traders came to Gombe to buy cotton lint but with the groundnut push and reduced or no cotton seed distribution, this has stopped. There has

been a heavy demand in Misau and the surrounding markets from Bornu and Gombe and it is unlikely that any great tonnage will be available for export. In Bornu an increased acreage was planted in the Nguru area and there are prospects for expansion in other parts of the Province.

A feature which gives rise to some concern is the incidence of Pink Bollworm. This serious pest is now widely spread in the American Cotton belt of the Northern Provinces. The degree of infestation is much greater than any year since 1944, when the Pink Bollworm was first found in this country; it is probable that the exceptionally high rainfall between July and October 1946 was favourable to the pest.

The Botanist has carried out selection work with Strain 26C and near relations, and the multiplication of tested strains for distribution is continuing along normal lines. Experiments were carried out to find the effect, if any, of topping and mulching on the yield and maturity of lint, and variety trials were made with selections from strain 26C and other varieties.

GUINEA CORN

23. On the whole the guinea corn crop was satisfactory although some areas suffered from excessive rain and water-logging. There was no doubt a reduction in the acreage planted with this crop owing to the recent good returns from groundnut growing and the efforts made to secure maximum production of the latter. Prices are high and as much as £14 per ton is being realised in some markets.

Some damage was done to the dry season "masakwa" crop in Bornu by an insect producing the disease known locally as "Mufi" and in the Shendam Division of Plateau Province sterility has caused serious losses in guinea corn crops. This condition is believed locally to be due to crossing with an introduced alien strain; the matter is being investigated.

RICE

24. There are two main rice growing areas in the Northern Provinces, namely Niger—Ilorin and Sokoto. In 1946 the former suffered badly from drought and the crop was estimated at only half the normal tonnage. Good crops were grown in Sokoto although excessive flooding took its toll in parts of that area.

In Southern Zaria water was short in the fadama at planting time, but subsequent rains helped to make the crop a success. Nineteen tons of Guiana 79 rice seed were bought at Kutura for re-distribution in other areas. The multiplication of this variety was continued also on the Bauchi Inkil rice farm and ten tons of seed was issued to farmers. Ten tons of seed was distributed also in Benue Province where four seed farms are now maintained by Native Administrations.

The Departmental rice mills at Badeggi and Baro have had a successful season and nearly 600 tons of rice were milled. Milled rice is supplied chiefly to Native Administrations in the Northern Provinces and to schools and institutions in the Southern Provinces. Demand however is greatly in excess of supply and large numbers of orders from African firms and private persons have to be refused. New machinery has been installed at Baro mill and will be ready for operation next season.

Single plant selections were made with five varieties of Upland Rice at Samaru.

BENNISEED

25. Yields have been low this year and there has been a further reduction in the amount of benniseed offered for export. Comparative figures for sales for export over the past five years are :—

								<i>Tons</i>
1942	..	..	..	..	..	..	..	7,494
1943	..	..	..	..	..	..	..	8,215
1944	..	..	..	..	..	..	..	9,074
1945	..	..	..	..	..	..	..	6,138
1946	..	..	..	..	..	..	..	4,085

MILLET

26. Crops were below average owing to shortage of rain at planting time and excess later in the season. Sokoto reported fair yields but elsewhere poorer crops were reported and in Kano Province they were estimated at only half those of the previous year.

CASSAVA

27. The acreage under this crop has been steadily increasing in the Northern Provinces during the last few years. Mosaic disease has been observed, and further investigation and experimentation are required with a view to obtaining suitable disease resistant varieties.

SOYA BEANS

28. It has been shown beyond doubt that this crop can be successfully tried into existing system of farming in parts of the Northern Provinces. There is little indication that it is likely to find much favour for consumption locally, but satisfactory yields have been achieved and its future as a cash crop must depend upon its value for export. Another sample consignment of twenty tons is being sent to the United Kingdom.

The most promising areas for soya bean cultivation are Benue, Southern Zaria and Southern Katsina. The Senior Agricultural Officer, Daudawa, is enthusiastic about soya as an alternative to groundnuts which are often planted in Southern Katsina on heavy clay soils, really unsuitable for this crop, which make harvesting an expensive operation.

In a trial of sixteen varieties at Samaru the varieties "Dixie", "Malaya", "28 EB" and "Benares" gave best results, all yielding over 900 lb per acre. Thirty-nine varieties were grown by the Botanist in observation plots; a variety "Sirsa" which remained green late in the season shows promise as a fodder type.

TOBACCO

29. It is estimated that about a thousand acres were planted in 1946 with tobacco for sale to the British American Tobacco Company. This should yield some 280,000 lb (double last year's figure and six times that of the previous year). The bulk of the crop is still grown in the wet season but increased interest is being taken in the dry season tobacco cultivation in low-lying situations. An increase in price, promised for the present season's crop, should make tobacco growing still more attractive in the future.

Yield trials and seed multiplication have been carried out and observations made on newly introduced varieties.

CASTOR

30. The growing of Castor in Benue Province is increasing, mainly under the influence of a price of £14 per ton for seed. An additional attraction is the fact that the crop is very easy to grow. Purchases for export during the first three quarters of 1946 were 270 tons, against 248 tons in the whole of 1947.

DATES

31. The ten acre plantation, established at Fika in 1941 with seed from selected local trees, has been extended by one acre to include varieties from Egypt and Iraq. Subsidiary plots have been established at Potiskum, Buni, Gumsuri, Shakwari and Geidam. The rate of growth at Fika, Buni and Gumsuri compares favourably with other main date growing areas of the world. In all the experimental plots, palms have produced offshoots. This is very important as it means farmers can be issued with offshoots, known to be female, instead of having to grow palms from seeds, half of which are likely to be male.

SUGAR

32. This industry continues to thrive and there is scope for development as soon as more mills are obtainable. One hundred and seventy-two mills are operating with an annual output of about 1,500 tons brown sugar. Twenty more mills are reported to be on their way from India but this is the last consignment we can expect from that source. The future of the industry would therefore appear to lie in the production of suitable crushing mills in the United Kingdom for export to this country.

GINGER

33. The Ginger growing industry although only a small one continues to flourish in Zaria Province. A hundred and three tons of cured ginger from the 1946 crop were sold for export at Kachia and Zonkwa markets compared with 33 tons from the previous crop, and 260 tons raw ginger were recorded as railed from Southern Zaria stations during the period April 1946 to June 1947.

In connection with the markets the usual analysis of ginger samples was carried out by the Chemistry section in the field laboratory. All 254 pre-market and market samples were found to satisfy B.P. requirements.

ONIONS

34. With a large demand elsewhere the export of onions from the main producing area of Sokoto is controlled in order to protect the local inhabitants. In 1946 (February to October) 267 tons were exported from the province compared with 223 tons in 1945.

WHEAT

35. The 1945-46 wheat crop in Sokoto was good and although this was not purchased by the Government it was readily bought by local traders and by buyers from Katsina and Kano. Reports indicate that the 1946-47 crop was excellent.

Observations were made on local and imported varieties of wet season wheat at Biu in Bornu Province. The real Bornu variety gives good results provided it is thatched after stacking or stored under cover. A South African variety has done well under irrigation at Alau.

POTATOES

36. The following figures refer to potatoes graded for railing and export from the two potato growing Provinces :—

					1945	1946
					Tons	Tons
Plateau Province	..	..	..	..	643	671
Zaria Province	..	..	..	..	372	244
					1,015	915

Increased production is expected next season in Zaria where this year's reduction is attributed to lack of confidence following the removal of British and United States armed forces from Nigeria, and the consequent reduced demand and slump in prices from 6d per lb during 1945 to 4d per lb at the end of that year. Prices in 1946 varied between 2d and 6d per lb.

VEGETABLES

37. With the withdrawal of the Air Force, Military, etc., the requirement of European vegetables greatly diminished, but there is still a big demand in Lagos and other centres of large European population. Market gardening is carried on locally around such centres, and Kano is the main centre for dry season production. Four hundred and thirty tons of fresh vegetables were railed from Kano to Lagos in the season 1945-46—an increase of roughly 50 per cent over the previous year.

FRUIT

38. The maintenance of orchards and nurseries and distribution of young fruit trees have been continued. There would appear to be a great future for budded mangoes throughout the Northern Provinces, but the prospects for successful Citrus growing are in most places bound up with facilities for irrigation. During the year some 2,700 budded and grafted fruit trees and 4,000 seedlings of various kinds were issued from our nurseries. There are good prospects for fruit growing under irrigation in Bornu, and good headway is being made with our nursery at Maiduguri, both as regards distribution in 1946, and successful budding for future distribution. Nearly 2,000 stocks were successfully budded in the Maiduguri nursery, and 13,000 seedlings were planted out for future budding at the new research farm. Subsidiary nurseries exist at six other centres in Bornu Province. An interesting and pleasing fruit, bearing resemblance to both the cherry and the damson, has been produced from a tree selfed by the Agricultural Officer, Maiduguri. The local name is Chizaki (Hausa) (*Corissa edulis*).

Floods at Kwarre, Sokoto, destroyed all the budded citrus trees in the orchard as well as over 2,000 mango seedlings. This will limit distribution in 1947.

FODDER AND PASTURES

39. Routine observations were continued in connection with grassland, etc., at Shika and Ilorin and, utilising the results of recent investigations, improvements were carried out in connection with existing pastures and the establishment of new grassland for grazing and hay making.

Local grasses have been grown in observation plots by the Botany Section at Samaru and some selections have been made.

Silage was made at a number of centres using various green materials and several types of silo.

KANO FARM AND DAIRY

40. In future the Experimental Farm at Kano will be financed entirely by Central Government and plans have been made for building and equipping a new model dairy. The Mixed farming cattle pool and other Native Administration activities are being removed from the old farm to a new centre four miles distant.

IMPLEMENT FACTORY, KANO

41. The Implement Factory has been working to capacity throughout the year. Cultivators, hoes, cattle carts, donkey carts, donkey harness, branding irons and dairy equipment have been made and a large amount of repair work has been carried out. Profit had to be cut to vanishing point to enable farmers to purchase. The turnover was £1,078 and the profit £65 compared with £580 and £175 respectively in 1945.

LOCAL INDUSTRIES

42. The demand for Badeggi raffia mats continues and is in excess of supply. Weaving sheds have been erected for makers who formerly worked in their own compounds; this has facilitated the manufacture of large mats and has helped to improve the quality. Samples of Kutigi and Abuja palm leaf mats were sent to England and the firms are now purchasing these for export. Several samples of Bida hats were sent to English firms and some trial orders were received. There is a steady local demand for these and the trade is now being handled by the commercial firms. Demand for ropes, twine and nets continues. Enquiries have been received from commercial firms for Yawa (cowpea) fibre for paper making.

In Bauchi sales of rope and twine amounted to £672. Most of this consisted of cotton twine for use by mat-makers at Ikot-Ekpene.

CONTROL OF "KASHIN YAWO"

43. Trials were carried out at Kano with the new anti-growth substances, Methoxone and Denoc. The conditions were unfavourable as the Denoc was not received until August by which time the Kashin Yawo had made strong growth and application of the materials was followed by continuous heavy rain. The effect of Denoc was spectacular and an application of two gallons per acre diluted in 200 gallons of water killed 99 per cent of the plants in three weeks. Five gallons of methoxone per acre showed 90 per cent of the plants destroyed and 7 per cent affected.

In order to be effective in a practical way control measures would have to be on a very large scale indeed, and the weight of the concentrated material would be a major economic factor, as ocean, rail and road freight form a large proportion of the cost. The suppliers have been asked, therefore, to advise whether the material could be supplied in more concentrated form and for details of cost in bulk.

At present the only solution to the problem of exterminating this weed appears to be a combination of mechanical control by Government and the Native Administrations and communal effort by the people themselves. Neither can be effective alone. The clearing of grazing grounds, cattle tracks, roadsides and other open spaces is

beyond the power of the local labour force, which is fully occupied with farming operations at the time when the weed should be pulled. All areas that can be sprayed will, therefore, have to be sprayed. On the other hand all farms carry a heavy infestation of the weed which normal farming operations do not control. It will not be possible to spray farm land and the area involved would be too great in any case and farmers will have to be forced to keep their farms clear. On grazing grounds rotational farming will probably prove to be the solution and an experiment on these lines is to be carried out at Dambarta.

LOCUSTS

44. Six locust scouts were employed. Specimens of the solitary phase of the migratory locust were found, and one band of hoppers hatched on a small swarm which did some damage near Ngala. No locusts were reported elsewhere.

NEW AGRICULTURAL STATIONS

45. Work was put in hand at two new provincial agricultural stations in respect of which funds were provided under the Colonial Development and Welfare Vote.

(a) *Yola*.—Two thousand acres have been acquired at Kofare, near Yola, for an experimental farm. The site was surveyed in detail and levels were taken over the whole area to a hundred yards grid. Ten miles of contour terracing were completed and a further fifteen miles surveyed and pegged. A temporary store and office were built and a house for a Senior Agricultural Officer was nearly finished. Two miles of permanent road were made. The nucleus of a herd of Adamawa Guadali cattle has been collected and the stock on hand at the end of the year comprised ten males and twenty-one females.

(b) *Maiduguri*. The new research farm at Ngurmiri, five miles east of Maiduguri, comprises 640 acres of land of which 100 acres are to be made available for the use of the Veterinary Department. No experimental work on crops has yet been started but an assortment of crops and plants, including a number introduced from the Middle East, have been established and are being kept under close observation. The most interesting of these is lucerne of which three varieties were brought from the Anglo-Egyptian Sudan and Northern Palestine. Thirteen cuttings taken from these gave a total yield of 20,000 lb per acre. An Argentine variety is also showing promise.

Two skeleton herds of Chad and Shuwa cattle were transferred to the new farm from the old Bornu Native Administration Farm. One of the Shuwa cows has shown exceptional promise as a milker, having given 5,400 lb milk and was still giving 95 lb per week five or six weeks before being due for drying off.

A brick kiln was built at the new station, labourers' quarters and carpenters, shop were built, and a start was made on the Agricultural Officer's quarters which should be completed by the spring of 1947.

D. H. BROWN,
for Deputy Director, Northern Provinces

Report of the Agricultural Department, Western Provinces, Nigeria, for the year 1946

GENERAL CROP AND WEATHER REPORT

The growing season of 1946 was most unsatisfactory for all kinds of annual crops. The early rains of April and May were satisfactory but from mid-June till early September there was an acute shortage of rain all over the Western Provinces. This had a most serious effect on the growth of the yam crop and in many farms the plants received a set back from which they never fully recovered. There was considerable anxiety during August as to the effect of this drought upon the food situation in the coming dry season, but fortunately the rains in early September and later were adequate to bring most crops to maturity, although reports were received of generally low yield of yams. The cotton crop was a failure owing to lack of rain at sowing time.

To illustrate the abnormally low rainfall a few comparisons with normal years are given :—

					1946	<i>Average</i>
Moor Plantation, Ibadan	..	..	..	..	41.8	47.5
Ife	..	..	..	..	41.6	56.5
Oshogbo	..	..	..	..	31.6	43.3
Ogbomosho	..	..	..	..	25.4	39.7
Ilesha	..	..	..	..	30.7	43.8
Benin, Ogba Farm	..	..	..	..	59.1	83.1
Ondo	..	..	..	..	54.2	65.9
Akure	..	..	..	..	40.3	57.1
Owo	..	..	..	..	38.0	57.2
Okitipupa	..	..	..	..	66.3	92.1

COCOA

2. *Botanical Work.*—Of the nineteen cocoa trees selected some years ago at Moor Plantation, the selection numbered T38 has continued to prove outstanding in size of bean combined with yield. The decision has accordingly been made to propagate this selection as rapidly as possible so as to provide planting material for farmers. While this clone is by no means the last word in cocoa selection, and is likely to be superseded in several years' time, nevertheless it is substantially the best we have at present and is well worth putting to good use until something better is produced. The proposal is to plant a number of plots with budded plants of T38 and thus produce rapidly a large quantity of clonal material from which seed can be supplied to farmers.

Progeny of these selections are now bearing regularly, and it is encouraging to find that seedlings of T38 produced from self-pollination retain the good qualities of the parent and in particular show superiority in size of bean over the other selections. The following table shows the average number of wet beans required to make one lb weight during the last eight seasons in the case of selfed progeny of T38 and of five other selections, in which the greater bean-size of the T38 progeny is consistently expressed.

Selection No.	No. of wet beans per lb. weight in the following seasons							
	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46	1946-47
T9	217	175	181	192	200	191	198	205
30	202	170	183	186	193	193	193	207
35	196	160	163	191	181	173	180	201
38	161	148	148	156	166	159	153	185
53	197	168	184	178	193	192	187	198
75	202	182	183	190	192	191	179	221

The cropping season for Nigerian Cocoa is divided into two parts. In the early part of the season comes the Light Crop, characterised as a rule by small pods and light-weight beans. This is followed by the Main Crop of larger pods and heavier beans. The following figures from the Agodi cocoa farm show the weight of a random sample of 300 dried beans from each three-weekly harvesting and illustrate the increase in weight of beans which took place early in August.

Date	Weight of 300 beans	Date	Weight of 300 beans	Date	Weight of 300 beans
8/4/46	oz 8½	22/7/46	oz 10	4/11/46	oz 11½
29/4/46	8½	12/8/46	12	25/11/46	11½
20/5/46	8½	2/9/46	12	16/12/46	11½
10/6/46	9½	23/9/46	12	6/1/47	10½
1/7/46	9½	14/10/46	11½	—	—

KOLA

3. The rooting of cuttings of high-yielding white kola trees on which great hopes had been based, has given unsatisfactory results and the technique will need to be greatly improved before this can become a practical method of obtaining superior planting material for distribution to farmers.

COFFEE

4. Observations were continued on different types of coffee planted in half-acre plots at Moor Plantation. *Liberica* remained the outstanding yielder followed by *Robusta* from several sources, as shown in the following table:—

Type	Average Yield per tree—fresh berries	Type	Average Yield per tree—fresh berries
Liberica, Strain I ..	23 lb	Uganda Robusta ..	9 lb
do. Strain II ..	18 "	Excelsa	9 "
Gold Coast Robusta ..	13 "	Java Robusta	7 "
Quillou Robusta ..	11 "		

The apparent lead of *Liberica* is, however, reduced when it is considered that the ratio of clean seed to fresh berry weight in *Robusta* is approximately 1 4, but in *Liberica* 1 7. *Robusta* has also the great merit of superior flavour. *Arabica* shows a complete lack of vigour at the low elevation of Ibadan. An attempt to impart vigour by budding *Arabica* on *Liberica*, *Robusta* and *Excelsa* stocks has given promising results. The budded plants look reasonably vigorous and have borne their first fruits.

CITRUS

5. In the report for 1944 it was stated that sour orange had proved the best of seven rootstocks for the growing of grapefruit and orange at Ibadan and Agege. The other rootstocks tried were acid lime, rough lemon, grapefruit, sweet orange, shaddock, and tangerine. General observations made at Umuahia suggest that the same conclusion does not apply there, and that, in the sandy soil prevailing there, rough lemon and Nigerian green orange are both to be preferred to sour orange. A statistical trial to test this point is planned at Umuahia.

CASSAVA

6. Work on cassava varieties and their reaction to mosaic disease has been intensified in view of the place this crop occupies as a main item of food, especially in the Eastern Provinces. Most of the farmers' cassava, west of the Niger as well as east, is heavily infected with the disease which in its severe form causes heavy reduction in the crop. Here and there occur varieties which escape disease or show apparent resistance and in past years some of these have been collected at Ibadan and hybrids made in the attempt to obtain new resistant heavy-yielding types. At Ibadan and a few other stations, some of these hybrids have proved distinctly superior to the local varieties, but from other stations, particularly in the wetter area to the east and south, come conflicting reports of their heavy susceptibility to disease and yielding less than the farmers' varieties.

The collection of types of cassava showing apparent resistance, or other notable characters, has been continued. Three varieties bred for resistance in the Gold Coast have been introduced, and another variety has been received from the Belgian Congo. Experiments have been laid down, or are projected, to find out more about the disease, what its rate of spread is; whether it can be controlled, as are potato viruses, by careful selection and planting of clean material; what is the meaning of the apparent resistance and its breakdown in certain conditions. This work is being done at Ibadan and replicated so far as possible at Umuahia in the Eastern Provinces.

Notes made on the incidence of mosaic in a yield trial of eight hybrids and one favourite local variety at Ibadan showed a surprisingly low rate of spread. In the case of the local susceptible variety, the first count three months after planting showed 42 per cent of the plants to be infected, presumably through planting of diseased material. The second count six months after planting, and at the end of the rainy season when symptoms are most apparent, gave only 44 per cent as infected, an increase of 2 per cent in three months. Corresponding figures for one of the hybrids were 6 per cent infected in the first count and 7.9 per cent in the second. In view of the heavy rate of infection usually to be found in farmers' cassava, such slow rate of spread cannot be normal.

COCOA SURVEY

7. Much better progress is now being made with the Nigerian Cocoa Survey as a result of the improved staff position. By the end of 1946 the full complement of four Cocoa Survey Officers had been appointed. Since the commencement of the survey in 1944 a total of 168,097 farms comprising 392,030 acres have been surveyed. It is estimated that rather more than two-thirds of the cocoa areas of the country (excluding the Cameroons) have now been covered and it is hoped that the initial survey will be complete by March 1948.

Apart from revealing the existence of Swollen Shoot disease in Nigeria the survey has exposed some very important facts regarding the present state of the cocoa industry.

Two outstanding features are the very small acreage of cocoa planted during the last ten years as a result of low prices, and the high average age of the cocoa trees in the main producing areas. As many farms cease to be productive after twenty years it seems probable that some decline in production may be expected during the next decade. Against this, however, some improvement may be expected in the standard of maintenance, and black pod control, if the better prices paid during the 1946-47 season are maintained.

Swollen Shoot disease is still confined to Oyo Province, the principal centres of infection being in Ibadan and Oyo Divisions. A new and isolated outbreak has recently been discovered on one farm near Ilshah. This is sixty miles from the nearest known outbreak. So far no further outbreaks in the district have been discovered.

The destruction of infected trees remains at present the only known means of checking the spread of Swollen Shoot disease. The treatment of diseased farms by cutting out all infected trees was commenced in February under the Ordinance passed by the Ibadan Native Administration. The work, however, was suspended shortly afterwards at the request of the Native Authority owing to increasing opposition on the part of farmers to the cutting out policy. Selected chiefs from the affected areas were taken to the Gold Coast to see the havoc wrought by the disease there with the result that they returned to Nigeria convinced of the wisdom of the cutting out policy. Control measures were resumed in June and steady progress has been made ever since. The total number of trees cut to the end of December, 1946 is 17,651 or approximately 44 acres.

COTTON

8. Botanical work in the South has been restricted to the continued selection of Improved Ishan cotton and was rendered extremely difficult by drought in the growing season and heavy attack from Pink Bollworm. To these factors may be attributed the higher ginning percentage as compared with previous seasons and the reduced halo length as compared with 1944.

	1941	1944	1946
Ginning percentage	31.1	35.6	36.3
Halo length	29.0 mm.	30.5 mm.	29.4 mm.

There was much damaged seed and the quantity of seed retained for our multiplication scheme was much less than usual. Seed was sold to farmers as in previous years but owing to the poor planting season sales were small. The bad season also affected the Meko multiplication area with the result that a proportion of commercial seed had to be used in the distribution to farmers. In all some 26 tons of seed were sold, approximately one-half of the quantity sold in 1945.

There was evidence of the increase in the incidence of Pink Bollworm. Although legal powers to compel farmers to exercise control measure have been taken by Native Administrations it is extremely difficult to enforce measures.

OIL PALMS

9. Little interest was shown in oil palm planting in Benin and Warri Provinces during the year. In Warri Province, farmers planted 101 acres while in Benin Province 197 acres were planted. A large proportion of the existing plantations were not well maintained, the difficulty in obtaining labour being the reason usually given. Considerably increasing interest in palm planting is being shown in Ondo Province and a demand for selected seedlings. In Oyo Province a small but steady demand for these improved seedlings continues.

OIL PALM RESEARCH STATION

10. The Oil Palm Research Station is passing through a phase of material development and with the limited staff available research has inevitably been pushed into the background. The routine records have been continued but the volume of data now accumulated is enormous and will take some years to analyse completely.

Until the end of 1945 the Station, with all its outstation activities throughout the Southern Provinces, was under the control of a single officer, but thereafter the staff situation improved considerably. By the end of the year the European Staff consisted of a Senior Botanist in charge, a Botanist engaged on plant breeding, and a Station Manager. The African Staff situation was good, except on the records side, and the hard work put in by most of them has made it possible to make reasonable progress in spite of the shortage of specialist officers.

In April 1946 the Secretary of State signed his approval of a free grant not exceeding £152,160 from the Colonial Development and Welfare Fund to cover the three years 1946-47 to 1948-49. In November definite allocations were made to those on the spot and it was possible to make a start with the capital works programme. Rapid progress does not appear likely, however, owing to the shortage of construction staff and more particularly owing to the lack of transport. While waiting for the negotiations for the Research Grant to go through the Nigerian Government made a generous vote of £29,800 to continue the work of the station during 1946-47 and to enable certain provision to be made for its future development. Large indents for capital equipment have been submitted and numerous temporary buildings have been constructed to provide accommodation for staff, African and European, and labour, until such time as permanent buildings erected by the Public Works Department shall be ready. The temporary buildings include one semi-permanent house and two bush houses for European staff, twenty quarters for African staff, 245 rooms for labourers, and a working shelter for the station management office staff.

A somewhat reduced planting programme was carried out in 1946, the total area being 55 acres comprising some 10,000 palms. The planting included 1,200 seedlings of various *pisifera* crosses and a "museum" collection of various material obtained from the Gold Coast, also seedlings from an alleged white-pericarp tree. Over 5,000 of the seedlings planted were laid out in the form of a transplanting experiment in which twenty-five different treatments were tested in statistical layout to determine the best technique for transplanting seedlings from the nursery into the field. The treatments included time of planting, leaf pruning, root treatments and insecticidal treatment. Previous reports have referred to establishment difficulties, both in the nursery and in the field, and this transplanting experiment forms part of the programme to investigate the problems involved. Nursery experiments designed to find control measures for the seedling root disease, were continued. With a background of three years planting failures from 1942 to 1944, and with only limited success in 1945, the most elaborate precautions were taken to ensure satisfactory establishment from the 1946 planting. With the exception of those planted in the transplanting experiment, where the object is, of course, to find essentially practicable treatments, nearly all seedlings were planted with a ball of earth, and the greatest care was taken against rodent damage. The season was a most trying one, the rainfall for 1946 being 22 inches below the average of 67 inches for the seven recorded years 1940-46, most of the shortfall occurring in July and August, the months during which much of the planting was carried out, and September and October. In spite of this it is satisfactory to report that at the

time of writing 1946 promises to be the first really successful planting year since 1941, the indications being that average losses will not exceed 10 per cent.

Nevertheless establishment problems must still continue to engage our serious attention, particularly as it seems possible that pathological problems may be involved. The most serious cause of loss after transplanting is undoubtedly due to rodents. At O.P.R.S. these animals are most persistent in their attacks. The most effective protection against them is a collar put round the base of the palms. These collars should preferably be of wire netting but as this material is still unavailable in any quantity it has been necessary to improvise with fences of bush sticks around each palm. These fences are unsatisfactory, however, as they only last for two or three months; they also attract white ants which may be a menace to the newly-planted seedlings. It has been found that palms must be protected against rodents for at least three years after planting, and that the pests may cause quite severe damage to the upper foliage of a palm even when the base of it is protected by a collar.

Dr Wardlaw, Professor of Cryptogamic Botany at Manchester University, has recently drawn attention to the existence of a wilt disease of the oil palm apparently caused by a species of *Fusarium*. This potential menace to the oil palm industry is being closely watched and field observations will be undertaken as soon as a full-time pathologist is posted to the Station.

The production of the three types of improved seed referred to last year has continued and the numbers produced were as follows:—

Dura × Dura	127,026
Dura × Tenera	127,270
Dura × Pisifera	122,644
Total	<u>376,940</u>

The demand for seed greatly exceeds the supply and it has been decided that for the time being only requests from within Nigeria can be met.

RICE

11. The exceptionally dry season was unfavourable to the upland rice crop in the Western Provinces. Several small "Planters Mills" were introduced and a start made with installing them in Abeokuta, Benin, Warri and Ondo Provinces. It is proposed to deal only with paddy which has been already parboiled by the owners as it was found by experience at the small Ekpoma mill that the parboiling process constitutes a bottle-neck at the mill itself, especially during the rainy season. It is also proposed to clean and polish native-hulled rice to make it more attractive in appearance.

NIGERIAN BIRDSEYE CHILLIES

12. The season was disappointing. In all 754 lb of seed were sold for planting. The weather was normal to start with and the very early plantings were successfully established. The later plantings had a difficult time in the drought and though they recovered during the late rains the quality of the crop suffered. The characteristic deep red colour was not attained. No appreciable quantity of chillies reached First and Second grades (1945 standards) and the crop was sold after much delay under special licence. Farmers were very dissatisfied with the price of £80 per ton for

chillies of this sub-grade (less than 25 per cent pale and discoloured and 5 per cent shrivelled, free of calyx, insect damage, etc.) as they expected to obtain £125. At £80, however, the price was better than last year's price, £75, for first grade chillies, and eventually some 60 tons were sold.

POULTRY

13. At Moor Plantation work on poultry was largely confined to the maintenance of existing strains by line-breeding. In each strain two or three brothers were mated in turn with their sisters and half-sisters. The two or three progenies so produced were compared for their first three months in lay, during which time they were outbred with cocks of unrelated strains in order to produce outbred eggs and chicks for sale. Among the Rhode Island birds considerable numbers of off-type inbred progeny appeared and were sold as culls. This almost certainly indicates some early admixture with non Rhode Island blood in each of the strains involved. It is not considered that this slight admixture has any deleterious effect. In fact it appears that quite the reverse holds true.

During the year, 606 birds and 1,900 hatching eggs were distributed as compared with 374 and 2,538 in 1945. 1,362 chicks were hatched. Incubator management during the year was very satisfactory as evidenced by the following figures showing percentage of fertile eggs hatched:—

Year	1943	1944	1945	1946
	per cent	per cent	per cent	per cent
Percentage fertile eggs hatched	61	71.3	76.3	78.8

Black Leghorn eggs were introduced privately at the end of 1945 and have been multiplied up during the year. Crosses between Black Leghorn and Nigerian and between Black Leghorn and Gold Coast birds have also been raised. Hatching eggs have also been obtained from a privately imported flock of Light Sussex. Both these breeds are good layers. The Leghorns naturally produce larger eggs but tend to be wild. The Light Sussex are much bigger and quieter birds but appear more susceptible to adverse weather than do the Leghorns.

There has been virtually no disease during the year and the condition of all flocks has been maintained at a satisfactory level.

A start has been made with the preliminaries for a new Poultry Development Centre which is intended to be the headquarters from which centralised research connected with all classes of poultry will be conducted. A site of some 300 acres has been chosen adjoining the Oyo N'Dama Cattle Multiplication Farm for convenience of administration and veterinary research. It was possible towards the end of the year to commence building operations on European and African Quarters. An officer of considerable experience with poultry in the United Kingdom and in India has been selected to be in charge of the new station. Ultimately it is intended that centralised breeding stations will be established in other parts of the country. The Veterinary Department has undertaken to conduct investigations relating to disease. The breeding work which will be carried out at this central station will consist of maintenance of suitable nucleus flocks of pure bred stock.

OYO N'DAMA CATTLE MULTIPLICATION FARM

14. A beginning was made to establish a farm for the multiplication of N'Dama cattle. The Oyo Division of Oyo Province was regarded as the most suitable area on account

of its moderate climate with adequate rainfall to ensure good grazing throughout the year. Preliminary searches for suitable sites were begun in January and final selection of a site on the main road from Oyo to Iseyin was made in September. The site consists of some 2,600 acres in pleasant undulating country and side by side with it is the area chosen for the new Poultry Development Centre. The two schemes are separate, but for convenience in administration and for the better utilisation of veterinary services they have been sited together. They will also in due course share in a water supply.

This cattle multiplication farm will be devoted to increasing, as rapidly as possible, the numbers of N'Dama cattle in the country. There is great demand for N'Dama bulls in the Western Provinces for village herd improvement and it is desired to multiply them as soon as possible. A foundation herd of eighteen bulls and seventy-five cows and heifers was purchased in French Guinea at the end of the year and arrived safely at the farm early in 1947.

AGEGE CATTLE FATTENING SCHEME

15. The Cattle Fattening Scheme at Agege, with its small subsidiary at Abeokuta, was discontinued early in 1946. They had provided definite information that it is not possible, under the conditions of the coastal areas, to replace in Northern Provinces trade cattle on an economic basis the losses in weight suffered on the two days train journey South. The results were very variable, some cattle showing rapid and satisfactory weight increases within three to four weeks, but the majority either did not put on enough weight or did not regain their weight prior to railment. It was found that three weeks was the longest period for which these Zebu cattle could economically be kept and that the majority of the beasts failed to show sufficient increase to justify the cost. The area of land used for this fattening scheme at Agege is being used for the Lagos Dairy which is being transferred from Lagos to more rural surroundings.

CATTLE CONTROL, ONDO AND BENIN PROVINCES

16. Considerable expansion in our scheme for the control of village cattle has been made in Ondo and Benin Provinces. The idea of herding has taken root and there has been a steady improvement during the year compared with the rather spasmodic interest of the first years. One Native Administration in Ondo Province has taken over the payment of the wages to herdsmen. This has resulted in regular wages and consequently a much greater interest has been shown in their work by these men. They also come more directly under the control of the Agricultural Staff and advice is more readily accepted. In Ondo Province the cattle census for 1946 shows approximately 4,600 head of cattle. Of these some 1,300 are now herded in thirty-five different herds. Inoculations against rinderpest, blackquarter and pleuro-pneumonia were carried out on over 600 cattle at twenty-four herds by the Veterinary Department.

In Benin Province similar progress has been made, particularly in Ishan and Kukuruku Divisions. Here middle belt conditions generally obtain and the grazing is good. In Benin Division, in high forest country, one village herd is now under control for the first time. Payment for the herdsmen is partly made by Native Administrations and partly by the owners. Routine inoculations were carried out by the Veterinary Department on some 470 cattle. Development in cattle control in both provinces has been slowed up through lack of suitable bulls but the progress made has been most interesting. The cattle are kraaled at night and prevented during the day from damaging crops. Appreciation of the value of the manure is not yet extensive but here and there use is beginning to be made of it by farmers.

THE YABA DAIRY

17. The Yaba Dairy continued to supply milk for the Lagos market but in reduced quantities owing to the partial cessation of railings of cows from the Northern Provinces due to contagious abortion.

The Dairy disposed of its entire stock of cattle early in the year with the object of obtaining a clean herd. It was possible to send from the North two consignments of cattle, one in April and one in July, totalling twenty-eight cows, four calves and one stock bull. No animals were returned to Zaria during the year.

Thirty-three cows reached the end of their lactation, the average yield per lactation being 1,616 lb and the average period of lactation 164 days. The average yield per day during lactation was thus 9.8 lb. The best individual record (Cow No. W226) was 3,993 lb of milk in 179 days or 22.51 lb per day during the lactation.

There were thirteen live-births, nine bulls and four heifers, and no abortions. All the heifer calves have been retained but three of the bull calves were disposed of. Five series of agglutination tests for contagious abortion were carried out on the old batch of cattle, which culminated in their disposal. There were altogether eight positive reactors. Fourteen calves belonging to the Dairy are now in isolation at Agege awaiting final certification as being free from contagious abortion before they are railed to Zaria.

The aggregate output of fresh milk was 4,660 gallons, valued at £1,220. No cheese was made during the year but sales of vegetables, compost and loafahs amounted to £67. The livestock disposed of fetched £453.

Chemical and bacteriological analysis has not been carried out since February, 1945.

EXPERIMENTAL DAIRY, MOOR PLANTATION, IBADAN

18. Owing to the incidence of contagious abortion in the small dairy at Moor Plantation many of the cows were culled. The remainder were transferred to another building and the main dairy altered in order to eliminate latent infection. The wooden stall partitions, always difficult to sterilise, were replaced by iron stanchions. The milk supply has decreased very considerably in view of the large reduction in the number of cows.

SCHOOL OF AGRICULTURE, IBADAN

19. The School Staff has been further augmented by the addition of one Assistant Agricultural Officer newly returned from the Imperial College of Tropical Agriculture, Trinidad, and by one Agricultural Assistant. At the end of the year the teaching staff comprised :—

- 2 Agricultural Officers.
- 3 Nigerian Assistant Agricultural Officers.
- 1 Gold Coast Assistant Agricultural Officer.
- 4 Agricultural Assistants.
- 1 Master, Grade III

Total 11 which gave a ratio of one member of the teaching staff to approximately eight students. In addition to these eleven, one member of the staff successfully completed his first and entered on his second year of the Cambridge Degree Course, and a second was entered at Edinburgh University for a Degree Course in Botany.

An extension to the existing School building was started in July and will provide much needed office accommodation for the increased teaching and clerical staffs, and a museum and library for the students. This extension was designed to equip the School for three classes of Agricultural Assistants in training, on the assumption that the Diploma Classes will ultimately be transferred to the proposed university.

The four Higher College Diploma students and six Gold Coast refresher students completed their first year. Nineteen Agricultural Assistants completed their third year of training and were posted to stations. Seventeen second-year Students, out of an initial class of twenty-five, completed their second year and twenty-four out of twenty-nine completed their first year. Two of the outstanding First Year Assistants were entered for the Higher College and both succeeded in obtaining places for the 1947-48 London Inter. B.Sc. course.

There were seventy-seven students in the School in January 1946 and sixty-nine in December 1946. The high rate of wastage experienced during the early war years has not been experienced this year. The total wastage during the year was eight, made up as follows :—

First Year Agricultural Assistants

- 2 resigned on failing School Certificate.
- 1 resigned on receipt of a warning.
- 1 resigned for further studies.
- 2 resigned for health reasons.

Second Year Agricultural Assistants

- 0 resigned

Third Year Agricultural Assistants

- 1 resigned after many warnings.
- 1 appointment was terminated.

Total, 8

A feature of the training has been the carrying out of experimental work by the students. These experiments have been carried out on manurial problems and the upkeep of soil fertility. Several of the students carried out useful small experiments on poultry rearing. All this forms excellent training and preparation for the future work of these students.

FARM SCHOOL, OYO

20. The Farm School at Oyo has made good progress during the year. The following table shows the number of youths trained since its inception :

Year of Class			No. of Applicants	No. starting course	No. finishing course	No. farming at 31.12.46
1942	..	..	20	12	12	10
1943	..	..	18	12	6	4
1944	..	..	17	9	9	8
1945	..	..	13	12	11	10
1946	..	..	12	10	10	10
1947	..	..	120	12	—	—
					48	42

The general progress and difficulties encountered have been fully discussed in previous annual reports. In the 1945 annual report it was stated that the response on the facilities offered had been poor as the pioneer students had not yet made good. Its addition, the elementary schoolboy prefers a town life to going back to the land, and the parents and masters are not convinced that there is any profit in farming. In 1946, therefore arrangements were made to advertise the farm school as it was possible to show visitors groups of literate settlers in the neighbourhood who had made good. In addition, the agricultural practices based on research at Moor Plantation were working satisfactorily. Large numbers of schoolboys, teachers and others visited the school and their visits were followed up by a widespread and thorough recruiting campaign. As a result 120 applications were received which gave wide scope for recruitment of the right type of scholar. It was therefore not necessary to offer places to illiterates, for whom the school was not originally designed. The illiterates, incidentally, have worked very well as is to be expected, since they have no other future than to farm. The 1946 class did only one year's training owing to staffing difficulties but the 1947 class will take the full two years' course.

The settlers are now more widespread, two having settled at Shaki and one at Kishi. The settlers who took up land at the Farm School have done well. Their herd of cattle is now big enough to be split into two, one of bulls only, each with a paid Fulani herdsman in charge.

The Farm School organisation was considered suitable for training ex-servicemen from middle belt districts in Oyo Province on similar lines, and a scheme was devised to offer twenty-four scholarships. The scheme differs from the existing one in that the men are allowed to have their wives with them and receive £1 per month subsistence as against 15s for the boys. There was no difficulty in filling the first eleven houses built, and it is expected that the full number will be recruited when accommodation is completed:

MOOR PLANTATION UNIT FARMS

21. Eight experimental Unit Farms were established between 1942 and 1944 at Moor Plantation. The object of these farms was to try out eight different systems of farming in suitable-sized, self-contained units for the average peasant family. Methods of cultivation and rotation and manuring, previously proved on a field scale, were here incorporated in actual farming systems, with the object of studying their impact on a peasant farm, and making any necessary adjustments before the systems were considered finally tried and proved and suitable for demonstration.

In all farms the system was so designed that the sources of income were varied, and did not depend solely on the sale of any one product, and in all farms the fertility was to be maintained so that no fallowing or shifting cultivation would be necessary. Each farm is intended to be of a suitable size for a family of one farmer, one wife, one child of working age, and one or two small children, and the arable area of the farm was designed to provide their chief requirements in staple food crops. With two exceptions the farms each occupy $7\frac{1}{2}$ acres, of which $1\frac{1}{2}$ acres is a fuel and building pole plantation. The two exceptions are the Cattle cultivated farm ($13\frac{1}{2}$ acres) and the Coconut farm ($9\frac{1}{4}$ acres).

The intended income of most of the farms depends to a considerable extent on permanent crops and these are not yet bearing. They are not yet even fully established owing to two very unsuitable and dry years for permanent crops. This must be realised in assessing the returns of the farms.

The farms were established on their present sites between 1942 and 1944, but were not run as family units until 1944, the families coming into residence during the first half of that year. 1945 and 1946 are therefore the first two full years' results and the returns in these two years are set out below. It is not, of course, possible so early to assess accurately the maintenance of fertility but crop yields reached a satisfactory level on all farms and there was no visible sign of any deterioration.

In the following summary of the types of farm, intended sources of income are given roughly in their order of importance. Those not yet fully developed are marked with an asterisk. The abbreviation S.A.F. indicates cash crops and surplus food crops from the arable farm and surplus fuel.

Farm No.	Type	Main Sources of income	Return (pence per day)	
			1945	1946
1	Cattle cultivated mixed farm	S.A.F., cattle, cocoa*, fruit*, hire of cart*	19.38	23.22
2	Hand cultivated mixed farm	Citrus*, rubber*, sheep, vegetables, S.A.F.	13.00	16.58
3	Hand cultivated mixed farm	Kola*, coffee*, sheep, citrus*, S.A.F.	10.59	12.66
4	Poultry farm	Eggs*, poultry*, vegetables, sheep, kola*, citrus*, S.A.F.	2.49	4.43
5	Sheep and fruit farm ..	Citrus*, palm produce, sheep*, S.A.F. ..	8.81	6.90
6	Coconut farm	Coconuts, fattened bullocks, sheep, palm produce, S.A.F.	17.19	13.78
7	Sheep farm	Sheep*, fruit*, S.A.F.	4.02	13.44
8	Pig farm	Pigs, fruit*, S.A.F.	9.63	18.35

In attempting to assess the potentialities of these farms, a convenient comparison of the daily return is with the local rate for daily paid labour, 16.00 pence per day. It is necessary, however, to bear in mind :—

- (a) in the case of any given farm the number of sources of income not yet in full production.
- (b) that the above figures are calculated on a 365 day year while the daily paid labourer, except for the few in really permanent employment, rarely works more than 200 days per year.
- (c) that the daily paid labourer normally has to bear the relatively high rentals of town dwelling.

J. L. B. KINCAID,
for Deputy Director, Western Provinces

Report of the Agricultural Department, Eastern Provinces, Nigeria, for the year 1946

SEASON AND CROPS

The following are typical rainfall records :—

RAINFALL (IN INCHES)

Month	Umudike Umuahia		Nkwelle Onitsha		Uyo		Abakaliki	
	1946	Previous Average	1946	Previous Average	1946	Previous Average	1946	Previous Average
January ..	0.75	1.00	0.13	0.62	—	2.06	0.96	0.44
February ..	0.05	2.13	0.45	1.16	3.60	3.87	0.13	1.09
March ..	2.50	4.91	1.31	2.36	4.94	6.27	2.00	3.90
April ..	6.00	8.08	6.48	6.40	11.10	8.38	4.25	6.05
May ..	9.51	10.41	16.65	7.59	8.05	11.42	15.58	9.86
June ..	9.25	12.57	9.21	9.28	9.09	9.37	9.10	10.62
July ..	11.70	11.05	7.56	10.83	11.22	11.67	12.27	10.13
August ..	2.10	11.26	1.31	9.17	5.49	11.11	1.28	10.96
September ..	11.62	13.62	9.86	11.39	13.97	12.69	13.78	13.40
October ..	9.76	11.50	12.76	9.80	10.86	11.32	9.38	11.98
November ..	6.21	3.44	1.89	2.46	7.83	5.29	0.73	2.31
December ..	0.25	0.81	—	0.50	0.20	1.89	1.52	0.52
Total ..	69.70	90.78	67.61	71.56	86.35	95.34	70.98	80.86

2. The total rainfall for the year was well below average. The rains were again later than usual in setting in, but the main feature of the distribution was an abnormal dry spell lasting in some areas from the latter part of July to early September. This dry spell caused concern for food crops at the time, especially in the northern belt, but favourable weather later saved the situation and final yields of most crops turned out to be good. Yields of yams and cassava, the staple foods, are reported to have been above average in most districts. Cocoyams and rice are the only two major crops on which the season had any serious adverse effect. Cocoyam yields suffered in the northern belt, but were not much affected in the southern and normally wetter areas. Rice yields were below average in Onitsha and Ogoja Provinces, and unfavourable planting weather in August resulted in a considerable reduction in the acreage planted in Onitsha Province. Yields from recorded oil palms indicate that in most areas oil palm yields were no better than in 1945, which was a poor cropping year.

3. On the whole the general food position was better than in 1945. Supplies of staple foods were adequate and, within the usual seasonal trends, prices remained fairly stable. Towards the end of the year, prices of staple foods tended to fall slightly in some areas as a result of good crops, but better crops did not have this effect everywhere. We have continued to encourage cultivation of more cassava, especially in areas where this is necessary to safeguard food supplies throughout the year, and the acreage under this crop continued to increase, encouraged also by increasing demand for cassava products and the fear of poor yields from other crops because of the abnormal weather.

SOIL FERTILITY

4. Experimental work on soil fertility problems was continued and extended, especially on Umuahia and Nkwelle Farms. Details of results will be given in a Departmental Bulletin to be issued later, but further substantial increases in crop yields were obtained with organic manures of all kinds, ash and lime; information is accumulating on the value and use of these and on improved shrub fallows, particularly *Acioa Barteri*.

5. *Artificial Fertilizers*.—A start was made on a comprehensive programme of experiments with artificial fertilizers designed to obtain as early as possible the required information on the effect of Nitrogen, Phosphate and Potash, and combinations of these, on different soils, and on the economic side. A new series of experiments was initiated at Umuahia and Nkwelle, but it is yet too early to draw any conclusions from the results, which were complicated in the case of yams by an unexpected adverse effect of Muriate of Potash on germination, probably caused by the method of application and dry weather after planting.

The programme for 1947 includes a series of new experiments covering varying soil conditions in Calabar, Owerri, Onitsha and Ogoja Provinces, and preliminary work in examining, selecting and obtaining sites for these experiments, was carried out. Eight suitable sites were obtained, distributed as follows:—

Owerri Province	..	..	Aba and Owerri.
Calabar Province	..	..	Abak and Ikot Ekpene.
Onitsha Province	..	..	Nnewi, Awka and Nsukka.
Ogōja Province	..	..	Ezza (Abakaliki Division).

6. *Lime*. Experimental work on our farms, and particularly at Umuahia, has proved that the application of lime to soils with a pH of under 5.0 results in substantial increases in crop yields over a long period, and that it can be an economic proposition when, of course, combined with other means of maintaining fertility. In an attempt to popularise the use of lime a widespread series of demonstrations in co-operation with farmers on their own farms and with free supplies of lime, has been planned to start in 1947 in Calabar, Owerri and Onitsha Provinces. Preliminary work to select suitable farms and to persuade farmers to agree to try liming was carried out, and this involved the examination of a great many farms and the testing of soil samples. A great deal of suspicion was encountered concerning the motives of Government in promoting these demonstrations, but in some areas, notably in Uyo, Abak and Southern Aba, quite keen interest was shown, and there was a fairly ready response. Two lime kilns were in operation at Awgu for most of the year, and production is in the hands of the Native Administration. Sales during the year amounted to 107 tons of slaked lime at a price of £3 14s per ton, in sacks at Awgu, and most of this was purchased by the Department for experiments and demonstrations.

SOIL CONSERVATION WORK

7. *Agulu Soil Conservation Centre*.—The Agricultural Officer, Onitsha, is a member of the Planning Committee for Agulu Soil Conservation Centre at which experiments were started to determine the best cultural treatments of soil on eroded and sloping farm land, and trials were made with various trees, shrubs and other plants, for regeneration of the soil and erosion control. For erosion control on sloping land, observations so far favour contour ridging, combined with contour bunding with small broad based terraces on slopes of 5 per cent or more. The value of contour ridging in this respect has also been confirmed at Nkwelle Farm and at a small trial farm at Udi.

So far, *Acioa Barteri* and *Gmelina* have proved the most promising and easily established of the various shrubs and trees tried, and lime had a marked beneficial effect on the rate of growth of the former. Molasses grass was the most promising of the spreading ground covers tried.

8. *Denuded and Impoverished Areas.* On the over-farmed, eroded and denuded areas of Onitsha Province and Northern Owerri, there is at present little left to conserve, and the primary agricultural problem is one of reclamation. The only practicable means of large scale reclamation is by the establishment of a good shrub cover, accompanied of course by control of burning, so that our primary aim must be to achieve this, and secondly to ensure that cultivation is controlled and on the contour. Most of the land of this type can never be made anything but second rate agricultural land, and although the pressure of population is such that it is necessary to attempt to restore it to a condition where it will be of maximum economic and agricultural value, it is obvious that this can only be achieved in an economic way if it is done by the people themselves.

9. Propaganda by extension work staff continues to be carried out with little effect, but an interesting project to attempt to get the people themselves to undertake planned reclamation of an area of poor and eroded farming land is in progress at Isuochi in the Okigwi Division. In order to retain the co-operation of the people it is essential that the work should proceed by easy stages, and for the present we are insisting only that there should be no burning, that farming for the year should be confined to one contour zone, and that cultivators should plant *Acioa Barteri* before leaving that zone. Farming rules on these lines were made, but although the area was not burned and farming was fairly successfully confined to one contour zone, the progress made in the establishment of *Acioa* was disappointing. However, the people are now showing more interest, and there is hope for better progress in this respect in 1947.

RICE

10. *Onitsha Province.*—Surveys of rice areas in Onitsha Province showed a total of 6,500 acres which is some 900 acres less than in 1945, and total yield was estimated at 2,500 tons of paddy, compared with 4,000 tons in 1945. The dry spell of weather lasting from the latter part of July to early September, was responsible for the reductions both in the area planted and yield. In the main producing area, which is in the Anambra River region of Onitsha Division, our main object now is to improve the type of rice grown, and 15 tons of Guiana 79 seed rice were distributed to planters. In an attempt to encourage rice cultivation in other suitable areas of Onitsha Province, several demonstration plots were maintained, and propaganda was carried out but with only limited success. A building for a rice mill was erected at Aguleri but the arrival of the machinery ordered has been long delayed. The mill and sheller arrived in November but the engine is still awaited.

11. *Ogoja Province.*—In Ogoja Province rice was not cultivated prior to 1943 when we started work on the crop, and the progress made since has been very satisfactory. A total of over 2,000 acres was recorded this year, and this figure does not include a good many small plots known to have been started by new farmers who are still too suspicious to draw attention to their plots. Yield figures were obtained from a number of representative plots and these gave an average yield of 16 cwts. paddy per acre.

Demonstration plots were maintained in Obudu and Obubra Divisions. Work was started in Obubra Division for the first time and although the area planted by farmers was small, there are good prospects for early and large scale development there.

Eleven tons of Guiana 79 seed were distributed to farmers in the Province during the year. A small rice mill was installed at Abakaliki but could not be worked owing to the breakdown of a second hand engine which is the only one we have yet been able to obtain.

12. *Owerri and Calabar Provinces.*—In Owerri and Calabar Provinces a preliminary survey, with trial plots, in swamps and flooded land was continued to ascertain the location and extent of land potentially suitable for rice. Demonstration plots and propaganda were also continued in areas proved to be suitable, but little success has so far been achieved in encouraging the crop, and we have not been able to overcome the lack of interest, caused mainly by the hard and unaccustomed work involved.

13. *Bamenda Division.*—Further trials with rice were carried out at Babungo on the Ndop plain on which there are extensive areas where soil and other conditions appear to be very suitable for the crop, but at altitudes of 3,000 feet and over. Unfortunately seed of varieties suitable for high altitudes, obtained from India, failed to germinate, and yields from other varieties tried were poor for reasons which cannot yet be explained.

OIL PALMS

14. *Production.*—Propaganda and advice to encourage maximum production of palm produce was continued by all extension work staff, but the total effect of propaganda of this nature is probably not very great. However, the proportion of palms not exploited is small except in some of the most thinly populated areas, and the fact that 1946 has been another poor year for palm produce is believed to be mainly due to a poor fruiting season for the oil palm for the second successive year. Palm oil grading figures for the Eastern Provinces in the calendar year 1946 show an increase of about 2,600 tons on 1945, but on the same basis palm kernel gradings show a decrease of 8,500 tons. These figures indicate that substantial quantities of nuts remained uncracked, and one of the most likely explanations of this is that producers have been building up reserves of nuts depleted during previous years as a result of production drives. In many areas it is common practice for producers to keep a store of nuts for use as a means of raising cash for emergencies.

15. *Oil Palm Planting.*—Further experience of palm plantations and the problems involved in the maintenance of soil fertility, made it necessary a few years ago to raise the standard of improvement of oil palm seedlings produced for distribution to planters. Such improved planting material is being produced as quickly as possible, but supplies available for distribution to farmers remained limited. There was a spontaneous demand for all available supplies of seedlings, which precluded active propaganda to encourage planting, and extension work was confined to advice and assistance in planting and maintenance. Planters particularly in Owerri Province made up their requirements by using bush seedlings.

Comparative figures of oil palm planting for the last three years are as follows:—

Year	Calabar Province		Owerri Province		Onitsha Province		Total	
	Approximate Acreage	Nursery seedlings supplied	Approximate Acreage	Nursery seedlings supplied	Approximate Acreage	Nursery seedlings supplied	Approximate Acreage	Nursery seedlings supplied
1944	50	5,430	200	9,190	68	4,072	318	18,692
1945	25	1,359	128	5,078	54	3,222	207	9,659
1946	60	3,919	203	7,957	50	2,900	313	14,776

Aba and Bende Divisions continued to be the main centres of planting in Owerri Province, though a few large demands were received at Ahoada mainly for planting in Degema area.

16. *Oil Palm Machinery.* 200 new palm oil presses were assembled in Calabar by United Africa Company Limited and distributed for sale during the year, but the demand again greatly exceeded supply, particularly in Owerri and Onitsha Provinces. Hand nutcracking machines remained difficult to dispose of. The existing type of machine does not stand up well to the working conditions and, owing to the high cost of labour involved in picking kernels from shell, operators find it difficult to compete with hand cracking by women and children. The repair service carried out by the Public Works, Marine and Railway Departments and by United Africa Company Limited, Burutu, was continued. The extension work staff inspected most of the existing machinery regularly, advised on operation and maintenance when necessary, and organised despatch for repair.

Details of recorded presses and nutcracking machines at the end of 1946 are as follows :—

<i>Province</i>	<i>Palm Oil Presses</i>		<i>Nutcracking Machines</i>	
	<i>Total</i>	<i>Out of order</i>	<i>Total</i>	<i>Out of order</i>
Owerri ..	497	30	18	11
Calabar	201	49	29	16
Onitsha	369	35	25	7
Ogoja ..	14	2	6	2
Total ..	1,081	116	78	36

Assistance in the introduction of Pioneer Oil Mills consisted of inspection of, and advising on, sites. This involved a great deal of work in detailed investigations on fruit supplies and local economy and custom concerning palm oil and kernel production and marketing. Agricultural Officer, Umuahia, and the local extension work staff assisted in an advisory capacity with the Mill which started operating at Amuro in September.

SETTLEMENT SCHEMES

17. In the early part of the year the Agricultural Chemist made a two months' reconnaissance survey of the Calabar-Oban-Ndian region, as far north as the Cameroons boundary, with the object of obtaining basic information on its potential productivity and capacity for development. He formed the opinion that while some areas of good soil exist, especially near the Calabar-Cameroons boundary, the general level of soil fertility is disappointingly low. The area is, however, capable of a certain amount of worth-while economic development, although it is unlikely that it can absorb sufficient settlers to make any big impression on the problem of overcrowding west of the Cross River. The Agricultural Chemist also investigated possible sites for the proposed experimental Settlement Scheme for 200 families based on 1,000 acres of oil palms as the main cash crop with Pioneer Oil Mill processing, and he selected an area which has since been demarcated and where the soil is believed to be reasonably good.

18. Owing to unforeseen delays in the completion of legal and other formalities in connection with the Scheme, it was not possible to start clearing operations on the site selected, and the work of the Assistant Agricultural Officer posted to the Scheme consisted

mainly of preliminary investigations and the planting and maintenance of 28,000 improved palm seedlings in a nursery on the site. He also assisted in supervising a small trial settlement consisting of eight holdings for road maintenance labour, and farming operations were started on these holdings. Crops were satisfactory and the settlers disposed remuneratively of surplus food to the road labour force. Approximately sixteen acres of improved palm seedlings were planted through the food crops.

FRUIT

19. The demand for fruit trees continues to increase, and that for budded trees still greatly exceeds the supply, though production is being speeded up as fast as possible. Fifty small Native Administration nurseries and three Departmental nurseries were maintained during the year, and most of the Native Administration nurseries now contain fruit planting material as well as oil palm seedlings for which they were originally established. Budded fruit trees ready for distribution were still only available in a few nurseries, however, and 2,300, mainly citrus, were distributed during the year.

Orange railings to the North from Owerri Province line stations amounted to 3,342 tons, compared with 1,753 tons in 1945.

NIPA PALMS

20. Investigations on the economic possibilities of the Nipa Palm continued in Calabar Province, but tapping trials with existing palms at Opobo failed completely. All the methods described in the available literature were tried, but little or no juice could be extracted. Although tapping of this palm is a complicated and skilled process and tappers may not have acquired the right technique, it seems probable that the complete lack of success may be mainly due either to an unproductive variety of palm or to unsuitable environment, and in view of this, seed of proved varieties is being obtained from Malaya for trial. Other work consisted of observations on growth and flowering on existing palms, and the establishment of three small trial plots under varying conditions.

ANIMAL HUSBANDRY

21. *Cattle and Sheep: Umuahia and Nkwelle Farms.* -Small herds of cattle and flocks of sheep continued to be maintained at Umuahia and Nkwelle Farms for the production of manure and for investigations concerning feeding management and disease, particularly resistance to Trypanosomiasis. The original Nigerian Shorthorn cattle stock is being graded up to N'Dama. Although there is a high incidence of Trypanosomiasis, particularly at Umuahia, cattle at both farms did quite well during the year and the death rate was low. Losses among sheep were also much lower than in past years, when Trypanosomiasis caused a high death rate.

22. *Cattle Fattening.* -Trials of the fattening of Zebu cattle under fly proof conditions, started at Umuahia in 1944, were discontinued at the end of the year. These were designed to ascertain if this was a possible project for a peasant farmer, who would obtain a substantial quantity of Farm Yard Manure in addition to the profits from fattening. Experience has indicated that while cattle fattening could be successful if special measures were taken to ensure that animals were free from infection on entry, this is not a practical proposition on a large scale at present. In dealing with ordinary trade cattle, while a number of animals do well, the loss from those which fail to respond to treatment with drugs is too high to make the proposition economic.

23. *Cattle at Bamenda.*—Work on cattle improvement was continued at Bambui Farm with the object of producing the type of animal best suited for a settled mixed farmer in the area. At the end of the year there were fifty-two breeding cows selected from the local Zebu types and these were bred to White Fulani bulls ex Shika. Milk records were indifferent but none of the heifers out of the Shika bulls have yet calved down. All stock maintained satisfactory health during the year. Efforts were continued to interest the local non-Fulani population in the keeping of cattle and two men are making an attempt at mixed farming, each having acquired a small herd of cattle. A coffee planter at Santa, who possesses some sixty cattle, has agreed to hire some out to other coffee planters for the purpose of manure making. The Native Administration school at Ndop maintained a small herd of cattle in excellent condition, and a demonstration of ploughing with cattle in that area evoked considerable interest among the people.

24. *Pig Keeping in fly proof houses.*—Trials of the keeping of improved pigs under fly proof conditions at Umuahia and Nkwelle continue to show that this is a promising line of work. There was an unfortunate outbreak of an incurable Streptococcal infection at Umuahia, which is unlikely to be a common occurrence but which necessitated slaughtering of the existing herd in the early part of the year and restocking, but apart from this, no serious disease problems were encountered. A few preliminary feeding trials were carried out at Umuahia. Protein rich foods from local sources are at present scarce and expensive so that it is difficult to obtain a satisfactory ration without the use of groundnut and palm kernel meal. When those products are available, and particularly groundnut meal, feeding presents few difficulties, but at present both are in limited supply.

Africans are showing a very keen and increasing interest in this work and many applications for breeding stock and assistance have been received. Until we have had more experience with our own trials, however, and until supplies of groundnut and palm kernel meals become more plentiful, we cannot encourage large scale development. We have, however, supplied stock, advice and supervision to a few selected individuals who are prepared to conform to housing management and feeding standards recommended, and will accept our advice. Ten privately owned fly proofed piggeries were inspected during the year, but in two of these supervision and advice has been discontinued because of unsatisfactory management and feeding, and one has been closed down. Although it is too early to say whether the remaining seven are likely to be successful, they have made a reasonably good start.

25. *Pig Keeping in Bamenda.*—Large White, Berkshire and Tamworth breeds are being tried at Bambui Farm where stock is produced for issue to farmers. All breeds do well under open conditions but so far the large White seem to be the most popular. Feeding presents few difficulties in Bamenda, but the high local cost of cement necessary for flooring houses is a limiting factor. There is a keen demand for breeding stock, but only those farmers known to be in a position to feed and house the pigs well are supplied.

26. *Poultry.*—The demand for improved breeding stock in many areas now greatly exceeds the supply, but we are trying to expand production as quickly as possible on Umuahia and Nkwelle Farms. 191 Rhode Island Red Cockerels were distributed during the year. At Ogwofia Owa in Udi Division, the people are attempting poultry improvement on co-operative lines. Six Rhode Island Red cockerels were supplied to the village centre, pens were erected and selected hens from local owners were mated there.

27. *Unit Farms.* Six experimental Unit Farms, operated as family holdings, three on and three outside the Departmental Farms, were maintained in Onitsha and Owerri Provinces. All of these carry livestock and are testing specific farming and manurial systems. They continue to provide valuable information concerning the practical application and economics of improved practices.

PASTURES AND FODDER PLANTS

28. Investigations continued at Bamenda, and on a smaller scale at Umuahia and Nkwelle, on the improvement and management of pastures and fodder plants. At Bamenda, in addition to experiments on controlled grazing, local grass and clover species were identified or sent to Kew for that purpose and observation plots of the most promising local species and a number of imported species were maintained. Kikuyu grass is one of the most promising of the latter.

Organic manures, artificial fertilizers and lime, produced substantial responses in manurial trials on grasses at Umuahia.

AGRICULTURAL AND ECONOMIC SURVEYS

29. Detailed preliminary agricultural and economic surveys, started in 1945, were continued, but progress was retarded by shortage of staff and lack of time to correlate, examine and analyse results. These surveys are conducted on a village basis in selected areas and are carried out by, or under the direct supervision of, the most reliable of the Agricultural Assistants. It is proposed to continue and extend this work, to which great importance is attached, as fast as the staff position and other work will allow. Although we have in the past acquired a wide general knowledge, local conditions, practices and customs concerning agriculture and economics are so complicated and variable that more complete and systematic surveys are essential. Without a store of detailed and accurate information of this kind, it is not possible to plan adequately for agricultural development.

BOTANICAL WORK

30. Hitherto shortage of staff has precluded any serious attempt to deal with botanical problems in the Eastern Provinces, but an Assistant Agricultural Officer, who was employed on botanical work at Ibadan and has since had a course at the Imperial College of Tropical Agriculture, Trinidad, was posted to Umuahia in December, 1946. To begin with his work will be concentrated on cassava, with particular reference to mosaic disease, which is widespread and which seriously affects yields of this crop which provides the staple food of the majority of the people. It is also intended to start work on beans early, in view of the serious protein deficiency in the diet of the masses in the Eastern Provinces. Observations and yield recording were continued on permanent crops at Nkwelle and Umuahia, consisting of citrus, kola and coffee.

CINCHONA

31. Work on Cinchona was continued at the experimental station maintained at Esosong in the Cameroons and on a smaller scale in Bamenda. An Assistant Agricultural Officer was in charge of Esosong station during the year. The programme of work was based on the recommendations of the Director of the East African Cinchona Research Organisation who visited the Cameroons in August 1945. This consisted mainly of extensive investigation on nursery technique and propagation by grafting

and cuttings, cultural experiments and growth observations on existing Cinchona, and establishing and testing superior varieties. Owing to shortage of planting material it was possible only to plant $7\frac{1}{2}$ acres in the field during the year bringing the total area established to $125\frac{1}{2}$ acres. At the end of the year the nurseries contained 135,200 seedlings of *C. Ledgeriana* and *C. Josephiana* and 14,700 successful grafts and cuttings of various types. *C. Succirubra* and a hybrid, *C. Succirubra - Ledgeriana*, both do well at Esosong but the bark of these has a low quinine sulphate content ; indifferent results have so far been obtained with the comparatively small areas yet tried of *C. Ledgeriana* and *C. Josephiana* which are superior in quinine sulphate content.

Future work and policy in the development of Cinchona depends on further information concerning the future of quinine, especially in relation to synthetic anti-malarial drugs, and further information on which to base policy is still awaited.

J. W. WALLACE,
Regional Deputy Director, Eastern Provinces

Annual Report 1946—Produce Inspection

The shortage of European supervisory staff in 1945 continued during the first half of 1946 but towards the end of the year the staff was augmented by the secondment of three Agricultural Officers and seven Development Officers for Produce Inspection duties. In April 1946 two super-scale posts were created, the post of Chief Inspector being converted to that of Assistant Director (Produce Inspection) and a new post, that of Principal Produce Officer, being introduced. In addition the cadre of Senior Inspectors of Produce was increased to five. The post of Chief Marketing Officer was abolished on the retirement of the holder of the post. The Marketing Officer was seconded for work in the Lagos Office on the abolition of the Marketing Section on 31.3.46.

Produce Inspection Staff continued to collect marketing information for record purposes.

2. The main crop cocoa season opened on 18th October, 1946 and is expected to close in March, 1947. There was a period of drought during the growing time which resulted in smaller beans in some districts. The season opened normally, the November and December 1946 gradings were the highest since 1942. The 1945-46 Main Crop was 94,497 tons. The light crop season opened on 26.4.46 and closed on 19.9.46. It was a good one and amounted to 8,209 tons as compared with 686 and 730 tons in 1945 and 1944 respectively. The figure of 8,209 tons is the highest since 1939.

The W.A.P.C.B. again purchased all cocoa for export and the naked ex-scale port of shipment prices were as follows:—

Main Crop, Grade	I	£50	0s	per ton
"	II	£47	10s	"
"	III	£45	0s	"
Light Crop, Grade	I	£24	1s	"
"	II	£22	11s	"

The premium was increased to 50s per ton as compared with 30s in the year 1944-45. The tonnage graded in 1946-47 was 110,894 tons as compared with 95,189 tons in 1945-46.

The quality of the cocoa offered for grading was not all that might be desired and showed little difference from that offered in the previous season. The result was that large quantities of cocoa in all areas were stored ungraded awaiting cleaning to bring it to exportable standards. The percentage of grade I fell slightly from 26.47 per cent in 1945-46 to 21.51 per cent in 1946-47. The general degree of fermentation was poor, 55 per cent of the crop being graded as over 20 per cent insufficiently fermented or unfermented.

The Light Crop amounted to 8,209 tons and was the highest since 1939. Due to the high tonnage graded, mixing was not as rife as in former years.

3. The groundnut season opened on 8th November, 1946 with expectations for a good crop at least equal to the previous year. The tonnage purchased in all areas was 322,699 tons as compared with 228,000 tons in 1944-45 and 301,699 tons in 1945-46. The price was fixed at £16 per ton at railhead with a minimum price of £11 per ton at stations off rail.

No inspection difficulties were experienced though much of the crop was stored in the open in large pyramids. Insect and termite damage was not as great as was feared.

The average percentage of impurities in the 1946-47 season's crop was 0.369 per cent as compared with 0.234 per cent for 1945-46.

4. Palm Kernel production in 1946-47 improved slightly, 311,772 tons being graded as compared with 283,471 tons in 1945-46, which was a very poor year. Production was some 10,000 tons below normal and it is expected that the increased prices announced at the end of the 1946-47 year will result in the normal output being restored.

The minimum price for palm kernels delivered ungraded and unbagged to a shipper at Lagos was £10 14s per ton up to January, 1947, as compared with £8 14s paid up to December, 1945.

The price increased from £10 14s to £16 5s 3d in February, 1947. The impurities content was normal except that in the Eastern Provinces a higher percentage of mouldy and rotten kernels was noticed in many instances. Oil content remained steady at 50 per cent to 52 per cent.

5. Palm Oil production was below normal although approximately 20,000 tons more oil was graded in 1946-47 than in the previous year. The tonnages were 130,357 and 110,230 tons respectively. Production was still some 20,000 tons below normal.

Although no oil is graded at Lagos the following prices were offered and are given as a guide to prices in general : -

Grade	F.F.A. Content per cent per cent		April 1946 to Jan. 1947	Jan. 1947 to March 1947
			£ s d	£ s d
I	0	to 9	16 16 6	25 6 6
II	Over 9	„ 18	15 6 6	23 1 6
III	„ 18	„ 27	14 6 6	21 11 6
IV	„ 27	„ 36	13 11 6	20 9 0
V	„ 36		12 16 6	19 6 6

Oil passed as First Quality by the Department was graded by the firms and the following figures show the general improvement during the past three years : -

Grade	1946-47 per cent	1945-46 per cent	1944-45 per cent
I	62	60	55
II	15	17	19
III	14	13	14
IV	8	8	10
V	1	2	2

6. The Nigerian American cotton crop in the Northern Provinces for 1946-47 was 29,658 bales (calculated) compared with 33,007 bales (calculated) for 1945-46. The price at ginneries was 2 $\frac{7}{10}$ d per lb as compared with 2 $\frac{1}{10}$ d in 1945-46, for Grade NA I. Quality was on the whole good though the incidence of pink bollworm raised the percentage of grade II slightly, as the following table shows : -

Year	Grade NA I per cent	Grade NA II per cent
1944-45	93	7
1945-46	95	5
1946-47	92	8

Ginning is not yet completed so that ginning percentages are not yet available. Final percentages are estimated to be :—

	per cent
Zaria	33
Funtua	32
Mallam Fashi ..	32½
Gusau	31½

Local demand for seed cotton for weaving continued to be high and much of the crop was used for this purpose.

7. In the Southern Provinces for the second year running the crop was very disappointing, both farmers and middlemen showing little interest in quality. The amount of extraneous matter extracted by the gins was abnormally high due to the fact that producers, being at the time more interested in cocoa, are apt to leave their cotton too long on the plants before harvesting. This crop is becoming unpopular compared with other crops and foodstuffs.

The following figures show the percentage of the grades during the past three years :—

Grade	1946 per cent	1945 .. per cent	1944 per cent
IN 1	3.7	7.2	2.3
IN 2	81.9	79.1	28.6
IN 3	14.2	3.1	29.1
NN	.2	10.6	40.0

The following prices per cwt were paid at ginneries during the past three seasons : —

Grade	1946		1945		1944	
	s	d	s	d	s	d
IN 1	20	7½	17	6	14	0
IN 2	18	3½	15	2	12	10
IN 3	15	11½	12	10	11	8
NN	10	6	10	6	10	6

8. No Cassava Starch was graded or exported during 1946.

9. The grading of potatoes continued normally though production showed a slight decline, 841 tons being graded in 1946-47 as compared with 888 tons in 1945-46. The trade is almost entirely in the hands of middlemen who are responsible for keeping up a high price. As much as 1s 3d per lb was at one time asked as the Lagos retail price. The price which the farmer gets is uncertain and probably varies from 2d to 3d per lb. Towards the end of the year potatoes from South Africa were being sold in Nigeria retail at 5d per lb and if the Nigerian producer is to compete with this traed he will have to accept lower prices unless farmers form co-operative societies to carry out their own marketing, thereby eliminating excessive middleman's profits.

10. Rubber exported in 1946-47 amounted to 10,205 tons in 1946-47 compared with 10,543 tons in 1945-46. Apart from Plantations exempt from the Regulations, 5,270 tons were graded as compared with 7,069 tons in the previous year. The reason for the decline is that the price dropped considerably while grading standards were raised, following on the gradual return to normal conditions in Malaya and the export from that country of large stocks of good sheet rubber.

New grading, based on Malayan standards, was introduced in 1946 and a great deal of work had to be done in training the staff accordingly. The work proceeded smoothly with one or two minor difficulties here and there.

PLANTATION RUBBER

The following table indicates the quality of rubber graded as compared with two previous seasons :—

Year	Sheet			Scrap	
	A1	A2	A3	C1	C2
1944-45 ..	29.92	40.97	2.13	0.55	26.43
1945-46 ..	16.82	43.92	8.94	0.93	29.39
1946-47 ..	17.10	59.80	19.20	3.90	—

11. After the first grading season 1945-46 the trade in Capsicums entered into difficult channels. Production of Birds-eye Chillies continued but the weather was not favourable in 1946 during the growing period, so that none of the chillies produced could pass the grade standards.

The situation was further complicated by indiscriminate buying at very high prices by middlemen who mixed their purchases to such a degree that grading was impossible.

Very much the same occurred in the Northern Provinces with Nigerian Ordinary capsicums, which were bought at a flat price irrespective of grade. As a result of the existence of a limited market for sub-grade capsicums the export was allowed under special licence of some 224 tons.

Prices offered were as follows :—

£		
Class I	Grade I	110 per ton
Class I	Grade II	80 per ton
Class I	Grade III	— per ton
Class II	Grade I	56 per ton
Class II	Grade II	56 per ton

Approximately 1,000 tons of capsicums were exported in 1946-47 as compared with 450 tons in 1945-46.

12. Tonnages of Ginger graded and exported during the past three seasons are shown below :—

Yellow Ginger	1947	1946	1945
Grade I ..	87 tons 8 cwt.	25 tons 1 cwt.	38 tons 3 cwt.
Grade II ..	17 tons 18 cwt.	7 tons 16 cwt.	5 tons 4 cwt.

Prices were as follows :—

	£	s	d	£	s	d	£	s	d
Grade I per ton ..	65	6	8	56	0	0	56	0	0
Grade II per ton ..	56	0	0	37	6	8	37	6	8

No white ginger was exported.

13. The Produce Inspection Branch continued the unofficial inspection of rice, fibre, and shea nuts during the year.

14. During the year 1946, due to many causes but chiefly to the lack of staff during the war and to the greatly increased duties of all officers resulting in an unavoidable dilution of supervision, Produce Inspection underwent a most difficult period. As an anti-climax to many years of competent work it was discovered that serious irregularities had taken place concerning the inspection of cocoa ; and, by collusion or otherwise, a considerable quantity of cocoa was incorrectly graded. A Commission of Inquiry was appointed by the Government and as a result various remedial measures were taken to restore efficiency.

J. R. VERNON,
Acting Assistant Director, Produce Inspection

Report of the Senior Agricultural Chemist for 1946

SOIL INVESTIGATIONS

In January and February a rapid reconnaissance study of the soils in the sparsely-populated Ndian-Oban area of Calabar and Cameroon Provinces was made in the field by an Agricultural Chemist, with particular reference to the possibilities of development along the road being made from Calabar to Mamfe. The majority of the land was considered to be inferior, but a quite promising area of 5,000 acres was chosen for an experimental settlement at the Kwa Falls, sections suitable for arable farming on a bush-fallow system, palm planting, and rice growing being indicated. It was recommended that a Forest Reserve be formed along part of the new road south of the Kwa Falls settlements, where extension of cultivation was taking place on unsuitable land.

In June and July a considerable tour in the Eastern Provinces was undertaken for a preliminary inspection of sites intended for manuring experiments. It was hoped to establish simple manuring experiments at most places where an extension assistant is stationed. These are designed to supplement the more detailed experiments on our own farms and at the same time to afford a demonstration of the effects of lime and artificial fertilisers to the local inhabitants. For this reason "treatments" had to be designed so that they could be expected to give a noticeable effect. Actually only eight were ready for the 1947 season.

Possible sites for new farms were inspected at Akure, Oyo, Agege and Abeokuta, and advice was given as to the more typical and suitable areas.

ONITSHA AND UMUAHIA EXPERIMENTS

Two manurial trials with artificial manures and lime were started on each of these farms. In each case the results with maize were very satisfactory, but all manurial effects on yams were concealed by the very great delay in germination caused by applying manures in the planting holes. In 1947 this question of the best method of applying manures will be investigated. At Onitsha, liming gave a 30 per cent increase in maize yield, superphosphate a 25 per cent increase and 10 per cent. At Umuahia only phosphate give a significant increase of nearly 20 per cent.

MOOR PLANTATION EXPERIMENTS

The new rotations mentioned last year were duly started and manurial trials were laid out on two of them. One consists of various mixtures of artificials applied twice in the rotation to yams and to early maize, and the other of 8 tons farmyard manure applied once in the rotation to early maize compared with a mixture of artificials containing equal quantities of nutrients and with 4 tons of farmyard manure plus mineral equivalent of 4 tons of farmyard manure. The maize crop was very heavy, particularly so on the farmyard manure experiment, where there were no significant differences between treatments and unmanured controls. On the artificials experiment, nitrogen gave a 55 per cent increase in yield and superphosphate 19 per cent. Potash was without effect. These results are well in accordance with expectations and previous small scale trials. The yam crop was too poor to be considered statistically, but the indications were similar.

CHEMICAL WORK AT O.P.R.S.

In the course of this year a systematic soil survey was made of the area set aside for O.P.R.S. This comprises some 4,000 acres mostly under forest of mixed growth. Representative profile pits were dug at about 100 points on the whole it was noted that

conditions were very uniform. The greatest contrast noted was between the upland fairly flat area, and the steeply sloping part descending to the river. Here the difference was mainly physical, with the upland area showing as a rule a heavier soil containing much more of the finer soil fractions.

The area as a whole is characterized by a soil which becomes intensely acid after the first few inches. There is no parent rock on which to draw for reserves of plant food and what goodness there is is concentrated in the first few inches. These top inches are comparatively fertile but can hope to remain so only if every precaution is taken to prevent undue loss of organic matter.

Subsequent investigation into the potash status of this area has shown that potential reserves are exceedingly small and even at 26 feet depth no indication was found of any improvement of this state of things. As palms have been shown to require considerable quantities of potash for adequate growth it would seem essential eventually to have recourse to artificial sources of this mineral.

VISIT TO GOLD COAST

In April the Senior Agricultural Chemist and Dr. Vine visited the West African Cocoa Research Institute at Tafo to meet Mr Charter of West African Cocoa Research Institute and Professor Aubert, French Soil Scientist in West Africa, for a discussion of aims and methods of carrying out soil surveys. It is hoped that the meeting inaugurated proper co-operation between the Colonies in the matter of soil mapping, so that there may be agreement on principles even if material progress in the various territories varies considerably.

K. HARTLEY,
Senior Chemist

Report of the Senior Entomologist for 1946

LOCUSTS (*Locusta*)

In early November, two small hopper bands of the African Migratory Locust were destroyed by villagers a few miles north of Dikwa. In early December, a swarm of the same species destroyed a guinea corn farm near Ngala (about twenty-seven miles North-east of Dikwa). As several hopper bands of *Locusta* were present in this area in the autumn of 1942 it has to be regarded as a possible outbreak centre of this species.

PINK BOLLWORM OF COTTON

This serious pest is now widely spread in the American Cotton belt of the Northern Provinces. The degree of infestation is much greater than in any year since 1944, when the Pink Bollworm was first found in this country; it is probable that the exceptionally high rainfall between July and October, 1946, was favourable to the pest.

CHRYSOPTER RESEARCH

A study was made of the life history of two species of *Chrysops* (flies which are known to carry *Filaria loa*) at the Oil Palm Research Station near Benin. It was found that whilst *C. silacea* is most abundant in July the other species, *C. dimidiata* does not appear until the second week of September. Groups of men and cattle have been found to attract the flies in numbers. The evidence obtained to date suggests that breeding is confined to the swamps bordering the local river.

HELOPELTIS SANGUINEUS ON COTTON

Helopeltis is a serious pest of cotton on Moor Plantation, where Ishan seed is multiplied for subsequent dispatch to the Meko area, where further multiplication is carried out. These Capsid bugs attack the vegetative parts of the plant as well as the buds, flowers and bolls, cause much distortion and loss of crop. It has been found that two dustings with Agrocide 3, an insecticide containing Gammexane (at a fortnightly interval) destroyed the whole *Helopeltis* population on the treated Cotton.

F. D. GOLDING,
Senior Entomologist

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